INPUT®

Federal Information
Systems and Services Program
(FISSP)

Federal Mid-Size
Systems Market

CONTENTS

FEDERAL MIDSIZE SYSTEMS MARKET

1988-1993

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**Federal Information Systems and Service
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Federal Midsize Systems Market, 1988-1993

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Abstract

INPUT forecasts the federal midsize systems market will sustain a 7% average annual growth rate for the period FY1988-FY1993. This market is expected to grow from $1.1 billion in 1988 to $1.6 billion by 1993.

The market growth for midsize systems will be influenced by several factors, including: the rise of departmental computing and networking among organizations within agencies; the availability of more-powerful, low-cost, midsize hardware; and general modernization efforts. The distinctions between classes of hardware will also continue to blur as technology evolves in the next five years.

In this report, agency plans for future use of midsize systems are analyzed. This report also identifies vendor status, vendors' marketing perceptions, contractor selection criteria, vendor performance characteristics, contracting preferences, and major contract opportunities.

This report contains 168 pages, including 67 exhibits.

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I

Introduction

This report on the Federal Midsize Systems Market identifies the issues and trends that significantly impact vendors competing in this market over the next five years. It attempts to offer insight into agency requirements and perceptions, and guidance to vendors in planning their strategies to successfully participate in the federal midrange marketplace.

The Federal Midsize Systems Market report is provided through INPUT's Federal Information Systems and Services Program (FISSP). Reports issued through this program are designed to assist INPUT's U.S. industrial clients in satisfying future federal government needs for computer-based information systems and services.

A
Purpose and Scope

This report responds in part to client requests for a detailed treatment of the federal hardware market. As this report was being developed, INPUT was also developing a report on the federal market for large-scale systems. In 1989, INPUT will produce a report on the federal microcomputer market.

This report also serves to supplement INPUT's previous reports on systems integration and facilities management. The report is intended to give clients a clear description of the current status and future trends of the federal market. It also identifies the key vendors in the market, a subject of continuing interest to INPUT clients.

For the purposes of this study, INPUT defined midsize computer systems to include IBM 93XX systems, all Digital VAX series systems, and such common UNIX-based systems as Altos and Gould. Intelligent workstations (such as those from Apollo and Sun) are also included. Most large shared-logic, integrated office systems—such as those from Wang, Hewlett-Packard, and Honeywell Bull—were also considered midsize systems. Microcomputers (either standalone, or shared), embedded systems, and CAD/CAM systems were not included. This definition was

developed with assistance from client discussions and from a review of the current industry literature.

This report covers GFYs 1988-1993. At the writing of this report, GFY 1988 was coming to a close, and some programs were affected by the DoD freeze initiated in April, 1988. Two government standards were also scheduled to be mandated in September, 1988: Government Open Systems Interconnection Profile (GOSIP) and POSIX (Portable Operating System Interface for UNIX). Both of these standards have significantly influenced hardware and software procurement decisions governmentwide.

The federal government has been reevaluating information technology systems in response to President Reagan's directive to elevate federal information processing to current commercial technological standards. Although some progress has been made, many federal agencies continue to lag behind the commercial sector in terms of hardware utilization and the automation of services.

Along with federal agencies' directive for ADP modernization, there has been a technological revolution of hardware capabilities. Powerful, smaller, extremely efficient hardware is continually evolving from the hardware manufacturers, and is changing the way and "where" of information processing through technological versatility and cost-effectiveness.

B
Methodology

The report's findings are based on research and analyses of several sources, including:

- INPUT's Procurement Analysis Reports (PARs) for programs to be initiated during the period covered by this report

- OMB/GSA/NBS Five-Year Information Technology Plans for GFYs 1988-1993 to identify major systems replacements and new system initiations (new starts)

- Interviews with leading federal midsize systems vendors to assess vendor perceptions of this market

- Interviews with federal agency officials to determine current and planned midsize computer utilization over the next five years

- Federal agency GFY 1988 Information Technology Budgets to supplement the identification of midsize computer acquisitions

- Computer Intelligence's analysis of federal equipment inventory, employed to provide up-to-date data on the current installed base of midsize systems.

Vendor and agency questionnaires often asked the same or similar questions for comparison purposes. (See Appendix F.) Federal agency officials selected for interview included:

- Agency executives at the policy level
- Program managers

Industry representatives selected for interview included:

- Marketing executives
- Technical executives
- Corporate executives

Vendor interviewees were selected because they were either identified as contractors of record for existing midsize computer systems, or listed as midrange systems vendors in INPUT's Company Analysis and Monitoring Services data base for 1988. The agencies selected for interview were identified in one or more of the above plans as proposing to contract for midsize systems solutions over the next five years.

In developing the market forecast, INPUT relied on several sources. First, INPUT's proprietary budget model was consulted. This model consists of all combined agency budget submissions, with additions for the off-budget items identified, and subtractions for the items that INPUT believes will be delayed or cancelled. INPUT also relied on the federal inventory data provided by Computer Intelligence. Finally, INPUT took the survey responses into account in adjusting forecast numbers.

C
Report Organization

This report consists of five chapters:

- Chapter II—contains an Executive Overview describing the major points and findings of the report.

- Chapter III—provides the market forecast and describes the major market issues and trends impacting the industry.

- Chapter IV—summarizes the federal agencies' requirements for midsize systems and the application areas supported by existing and planned systems.

- Chapter V—presents the vendors' perspectives on the federal midscale systems market.

- Chapter VI—provides a sample of business opportunities for programs and initiatives in the federal market involving midrange systems.

Several appendixes are also provided:

• Interview Profiles
• Definitions
• Glossary of Acronyms
• Policies, Regulations, and Standards
• Related INPUT Reports
• Questionnaires

II

Executive Overview

A
Federal Midsize Hardware Segments

Continuing technology improvements, advances in software design and
functionality, and innovative approaches to computing have blurred the
traditional distinctions between large-scale, midsize, and small systems.
Various references and authorities define the terms differently. The
problem is especially acute for midsize systems since they may expand to
the fringes of both large and small systems.

In segmenting the market, INPUT consulted its clients to determine their
preferences for dividing the market. Discussions with INPUT clients and
participating vendors in this study led to an assessment of the classes of
systems that should be included in the current federal midsize system
computer category. These segments are conceptualized in Exhibit II-1.

EXHIBIT II-1

COMPUTER HARDWARE SYSTEMS

COMPUTER SYSTEMS				
Large	Midrange			Small
Supercomputers Mainframes Minisupers	Small Mainframes Superminis	Traditional Minicomputers	Intelligent Workstations	Micros

Increase ◄——————————— Capacity ———————————► Decrease

Vendor and agency participants in this study complied with the following
definition of midsize systems:

- IBM 93XX systems

- All Digital VAX series systems

- Common UNIX-based systems such as Altos and Gould

- Intelligent workstations such as those from Apollo and Sun

- Shared-logic, integrated-office systems, such as those from Wang,
  Hewlett-Packard, and Honeywell Bull

Microcomputers (either standalone or shared), embedded systems, and
CAD/CAM systems were not included.

Distinctions at the high and low ends of the midrange computer category
are already blurring due to technology changes. Evolving technology
changes will no doubt totally redefine hardware categories by 1993.

B
Market Forecast

The federal market for midsize systems will grow from $1.1 billion in
FY1988 to $1.6 billion in FY1993, an average annual growth rate of 7%.
The midsize market forms a key component of INPUT's overall hard-
ware forecast, as displayed in Exhibit II-2.

EXHIBIT II-2

HARDWARE FORECAST

□ Microcomputers
▨ Midsize Systems
▧ Large-Scale Systems

GMIS
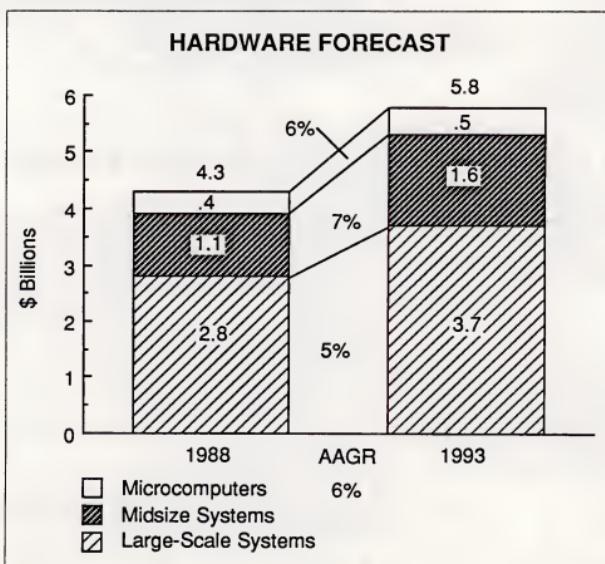
Although INPUT has not previously forecasted the federal midsize computer market, INPUT has regularly provided forecasts for the overall federal hardware market. The $4.3 billion total for FY1988 represents a slight reduction from $4.5 billion, which INPUT provided at its federal conference in June 1988.

This change arose from the following factors:

• Several major hardware procurements, expected to be awarded in FY1988, have been delayed as a result of an unprecedented level of protest activity.

• Higher than expected salary expenses in many federal agencies are causing a reduction in many program areas, including information systems.

The growth in midsize systems occurs as a result of several factors, including the following:

• Most shared-logic office information systems are built around midsize computer systems.

• Many applications formerly reserved for mainframes now operate quite effectively on midsize systems.

• Many agency functional areas can effectively control their own resources through the acquisition of midsize systems.

C
Largest Agency Buyers, 1988

Within the federal sector, civil agencies employ midrange systems with considerably more frequency than do DoD agencies. The installed base at civil agencies almost doubles the number of systems installed at DoD agencies. However, comparison of the number of systems in relation to the purchase value of systems implies that the DoD had newer, more complex systems in its inventory, as shown in Exhibit II-3.

Within the civilian agencies, the Department of Energy, followed by Agriculture and NASA, were the largest users of midrange systems in 1988. At the DoD agencies, the Navy led in having the highest proportion of systems installed. Although the Air Force had fewer systems, the estimated purchase value almost rivaled the Navy's. This suggests that the Air Force has a higher proportion of newer, more sophisticated midsize hardware.

EXHIBIT II-3

MIDSIZE SYSTEMS INSTALLED
AT FEDERAL AGENCIES

	DoD Agencies	Civil Agencies
Total Number of Systems	3,528	6,970
Purchase Value of Systems ($ Thousands)	314,824	492,284

Source: Computer Intelligence, September 1988.

D

Agency Preferences

To fulfill their midrange systems needs, federal agencies prefer to seek the services of hardware vendors as shown in Exhibit II-4. Agencies ranked systems integrators as their second choice, followed by software manufacturers. This ranking suggests that most agency respondents continue to feel more comfortable with primary providers of products and services. However, the distinction between system integrators and professional services firms may blur considerably in a given procurement. Rather, the agency ranking reflects agency perceptions of vendor specialties. The findings reflect a traditional view of vendor sources among agency respondents. The assumption that hardware comes from hardware vendors still prevails throughout the government. However, a growing minority of agency executives is beginning to see the value of system integrators in responding to especially complex government needs.

E

Bid Selection Criteria

Other criteria that affect agencies' selection of midsize systems providers are shown in Exhibit II-5. The proposed technical solution continues to carry the most weight for agencies in evaluating bid proposals. Cost factors—both the proposed life cycle costs and the initial cost of a program—follow as the next most highly ranked criteria in the selection of midsize contractors. However, INPUT has consistently found, when procurements reach best and final stages, that contracting officers almost always favor the bidder with the lowest price. One must also take into account that often the proposed technical solution is mixed with cost factors, considering that the cost of one minicomputer rivals that of several micros.

EXHIBIT II-4

AGENCY PREFERENCES FOR MIDSIZE SYSTEMS CONTRACTORS

Contractor Type	Agency Preference by Rank
Hardware Vendor	1
Systems Integrator	2
Software Manufacturer	3
Professional Service Firm	4
Aerospace Division	5
Not-for-Profit	6

EXHIBIT II-5

RELATIVE IMPORTANCE OF BID SELECTION CRITERIA

Selection Criteria	Vendor Ranking	Agency Ranking
Proposed Technical Solution	1	1
Life Cycle Cost	2	2
Initital Cost	4	3
Contract Type	5	4*
Risk Containment	3	4*

* Both criteria were ranked the same by respondents.

Despite regulations to the contrary, many contracting officers engage in technical leveling. Under this process, low-priced bidders with technically defective proposals are given the opportunity to correct their deficiencies. This procedure is not new. In most negotiated procurements, a "deficiency list" goes out to the bidder after initial proposal evaluation. The process becomes technical leveling when contracting officers state explicitly what the bidder must change in order to put the proposal into the competitive range.

F

Leading Midsize Vendors, 1988

As might be expected, Digital Equipment Corporation is the leading midsize hardware vendor in the federal marketplace. Fifty percent of all currently installed midsize systems are DEC machines. DEC machines have a current purchase value estimated at 57% of the total value of all vendors' systems. This statistic suggests that DEC systems tend to be newer. Data General has the second highest proportion of this market, 10%, followed by IBM and Sun Microsystems competing for third place. Examination of the purchase values for IBM and Sun shows that each vendor has a lower estimated purchase value as shown in Exhibit II-6.

EXHIBIT II-6

VENDOR SHARE OF INSTALLED MIDSIZE SYSTEMS
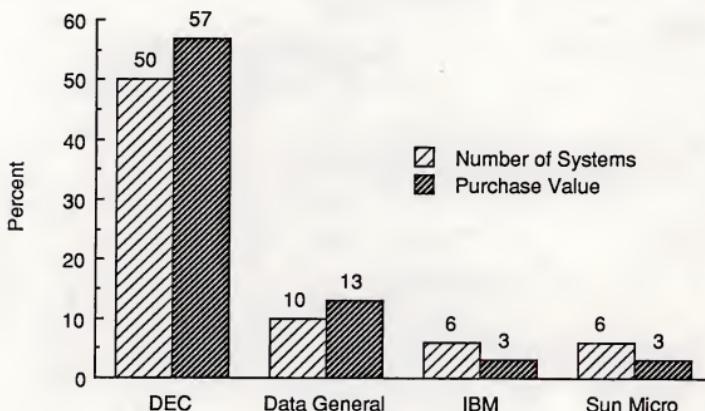
Source: Computer Intelligence, September 1988

The data suggest that IBM has not made significant penetration into DEC's midsize market with the 9370 machine. Whether this lack of penetration is due to low acceptance of this machine's technology, or to the short time the machine has been available relative to the usually long federal procurement cycle, is not yet apparent. The 9370's market share and the future of the AS/400 in the federal government will become more visible in the next six to twelve months. However, barring contractor disbarment, it is highly unlikely that IBM will overtake DEC in the federal market.

G
Competitive Outlook

The competitive arena for the midsize federal market will be affected by trends specific to the federal and commercial markets through FY1993, as shown in Exhibit II-7.

EXHIBIT II-7

COMPETITIVE FACTORS IN THE MIDSIZE MARKET FY1988 - FY1993

- GOSIP- and POSIX-Compliant Products

- Technology Advances

- Federal ADP Modernization

- New Start-Up and Foreign Manufacturers

- More Civilian Opportunities

Vendors who are first to offer GOSIP- and POSIX-compliant products will strongly increase their market shares. Federal regulations require that most information technology procurements must comply with GOSIP and POSIX standards within the next two years. The federal community is also demanding powerful shared resources that can handle a myriad of departmental and data center functions. Midrange computers are playing a vital role in delivering decentralized and networked environments. The logical machine choice to handle distributed data bases is midrange systems.

Although the commercial market is no longer experiencing significant growth, the federal midsize sector is viewed as a viable growth area. Technology advances are facilitating higher-capacity midrange machines at lower prices that compete with traditional mainframe- class machines.

Conversely, technology advances will also be changing the microcomputer market. The advent of 386 chip technology will adversely affect the lower range of midsize computer systems. Microcomputers based on the 386 chip are becoming attractive alternatives to many midrange systems.

Improvements in technology have also coincided with the federal government's information technology modernization directives. In short, the federal marketplace is buying systems to update existing automated functions, and to automate many functions that were previously done manually.

The major players in the midrange market will also experience increased competition from new start-up vendors and foreign manufacturers who see new market opportunities due to federal ADP modernization programs and new technology.

Although a higher proportion of vendor respondents in this study saw most of their midsize system opportunities within the DoD agencies, data from the GSA and Computer Intelligence point to significantly more opportunities in civilian departments. The vendor respondents in this study have been concentrating their efforts on DoD agencies, thereby missing additional markets for midsize products.

H
Recommendations

Vendors need to respond to federal agencies' increasing expectations that vendors will take full technical responsibility for the success of programs. In the absence of large numbers of highly trained data processing personnel in the federal sector, agencies are forced to rely on the vendor community to take more and more responsibility in a variety of function areas. Agencies expect vendors to expand on the functional requirements of RFPs and to actually volunteer technical capabilities and knowledge of new technology. Creativity and innovation will foster increased market penetration by smaller vendors. INPUT's recommendations to vendors competing in the federal midsize market are shown in Exhibit II-8.

In general, vendors need to supply highly trained technical personnel throughout all phases of a contract. Agencies are turning to vendors to handle support problems and issues that develop during the life cycle of a system.

EXHIBIT II-8

RECOMMENDATIONS

- Increase Technical Responsibility

- Learn Agency Cultures

- Support Standards Compliance

- Foster Mutual Trust with Other Vendors

In order to fully meet an agency's systems requirements, vendors must understand the cultures of specific agencies. RFPs describe the technical and mission requirements of a system. RFPs are limited as to what they can represent about the inner culture and social milieu of an agency or bureau. Vendors should further develop their relationships with agency personnel to understand the hidden needs and agendas for agency information technology systems. As every sales representative knows, a sale is seldom lost if the products and services meet or exceed the stated needs of the buyer.

By quickly bringing new POSIX- and GOSIP-compliant products to the marketplace, vendors will secure their federal market shares. Vendors will quickly establish reputations as sources for OSI products.

When involved in teaming relationships with other vendors, vendors increasingly need to view other vendors as business partners, and not as adversaries or competitors. A united front based on mutual trust and professional respect will improve agency perceptions of vendors, and assist in winning future contracts.

III

Market Analysis and Forecast

As has already been pointed out, technology advances have largely blurred the distinction between large and midsize systems. Available applications also tend to mix the categories, since many federal applications will function efficiently and effectively on large and midsize systems. However, for the purposes of analysis and forecast, INPUT has divided the categories largely along the same lines described by Data Sources, Inc. Section A provides more detailed information on the breakout.

In developing its forecast, INPUT identified and analyzed trends affecting the federal hardware market in general, and the midrange category in particular. Some trends, such as the growing federal popularity of supercomputers, directly affect the large-systems category. Others, such as present and future budget constraints, affect virtually all information system categories. Therefore, in developing this section, INPUT took into account all significant trends.

A
Market Structure

1. Definition of Midsize Systems

The market definition of midsize computer systems is continually evolving as technology developments occur. There are few distinctions at the high end of the midrange and among traditional mainframe systems. Distinctions at the low end are also blurring due to the advancing power of personal computers based on 386 chip technology.

For this study, INPUT defined midsize computers as:

- IBM 93XX systems

- All Digital VAX systems

- Common UNIX-based systems such as Altos and Gould

- Intelligent workstations such as those from Apollo and Sun

- Shared-logic, integrated office systems, such as those from Wang, Hewlett-Packard, and Honeywell Bull

Microcomputers (either standalone or shared), embedded systems, and CAD/CAM systems were not included in INPUT's classification of midsize computer systems. Another related INPUT report, *Federal Large-Scale Systems Market, FY1988-FY1993*, covers mainframe and supercomputer usage and trends.

Clients, and participant vendor and agency respondents, agreed with INPUT'S definition of midrange computer systems. INPUT's definition is similar to commercial practices, such as found in *Data Sources*, except INPUT has included all Digital VAX systems in the midrange category.

2. Federal Market Shares—Installed Systems

Exhibit III-1 gives a distribution of midsize computer systems currently installed in civilian and defense agencies. Civil agencies have almost twice as many installed midsize systems as do DoD agencies. Although DoD agencies have only 34% of the actual installed base, they have approximately 40% of the purchase value of all midsize computer systems at government agencies.

EXHIBIT III-1

MIDSIZE SYSTEMS INSTALLED AT FEDERAL AGENCIES

Midsize Systems	DoD Agencies	Civil Agencies
Total Number	3,528	6,970
Purchase Value ($ Thousands)	314,824	492,284

Source: Computer Intelligence, September 1988.

The percentages of systems, both by number and purchase value, for the major civil agencies are shown in Exhibit III-2. The largest share of civilian systems is installed at the Department of Energy (24%) followed by the Department of Agriculture (19%) and NASA (14%). The percentage of purchase values for both the Department of Energy (19%) and the

Department of Agriculture (23%) is almost the exact reverse of their installed base. This fact suggests that Energy has a much higher volume of low-priced systems than does Agriculture. This situation may stem from Energy's concentration of processing power in a relatively small number of laboratories, as opposed to Agriculture's more widely distributed systems. Most of the remaining civilian agencies have similar percentages for the number of installed midsize systems and their purchase values. The exception is the Veterans Administration. Midsize computer systems at the VA make up 11% of the total number of systems, but the purchase value of midsize VA systems is estimated at 8%. Most of the VA's midsize systems located at hospitals consist of older Digital hardware, resulting in lower unit value.

The distribution of midsize systems among the major defense agencies is depicted in Exhibit III-3. The Navy leads all other DoD agencies in the number of currently installed systems and in the purchase value of these systems. The Air Force has the second highest percentage (30%) of midrange systems, but conversely the purchase value share is 35%. This suggests that the Air Force has newer, more-sophisticated, and thus more-valuable systems than does the Army, which has a higher percentage for number of systems than for systems value.

EXHIBIT III-2

MIDSIZE SYSTEMS INSTALLED—CIVILIAN AGENCIES
Percentage by Number of Systems

Interior 5%
Commerce 6%
Postal Service 3%
HHS 3%
Transportation 2%
Treasury 2%
TVA 2%
Other 11%
Energy 24%
VA 11%
NASA 14%
Agriculture 19%

Percentage by Purchase Value of Systems

Interior 3%
Commerce 4%
Postal Service 3%
HHS 3%
Transportation 2%
Education 2%
Justice 2%
Other 13%
Energy 19%
VA 8%
NASA 13%
Agriculture 23%
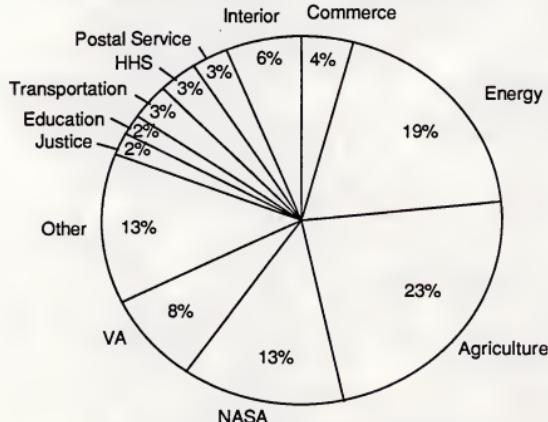
Source: Computer Intelligence, September 1988

EXHIBIT III-3

MIDSIZE SYSTEMS INSTALLED—
DEFENSE AGENCIES
Percentage by Number of Systems
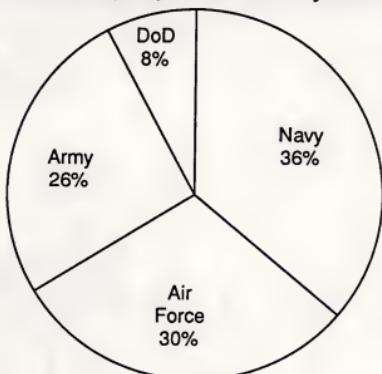
Percentage by Purchase Value of Systems
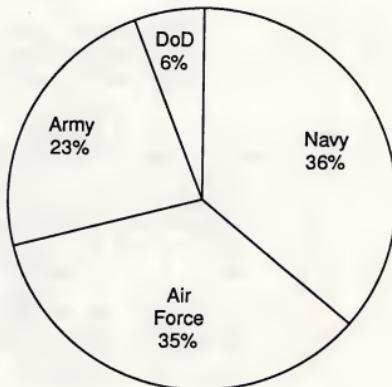
Source: Computer Intelligence, September 1988

B
Market Forecast

The federal market for midsize systems will grow from $1.1 billion in FY1988 to $1.6 billion in FY1993, at an average annual growth rate of 7%. Exhibit III-4 divides the federal hardware market into large-scale systems, midsize systems, and microcomputers.

EXHIBIT III-4

HARDWARE FORECAST

$ Billions

	1988	AAGR 6%	1993
Total	4.3		5.8
Microcomputers	.4	6%	.5
Midsize Systems	1.1	7%	1.6
Large-Scale Systems	2.8	5%	3.7

☐ Microcomputers
▨ Midsize Systems
▩ Large-Scale Systems
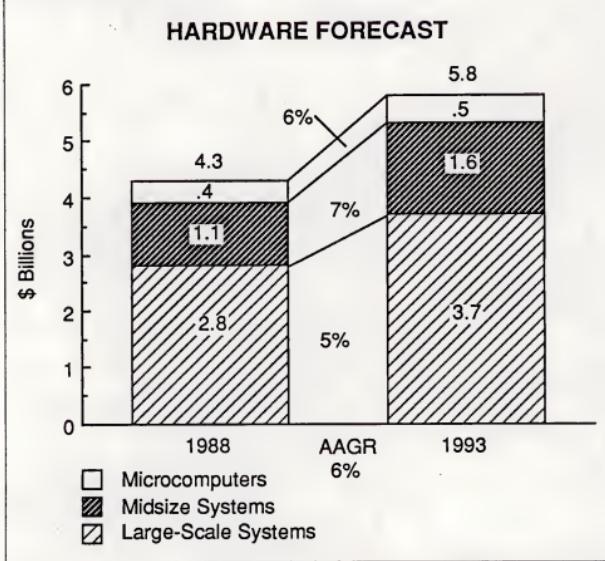
As part of our forecast model, INPUT has regularly provided estimates of the growth in hardware sales to the federal government. However, this is the first time INPUT has presented a breakout of that forecast by segments. INPUT differed somewhat from other market research firms by dividing the federal hardware market into large scale, midsize, and microcomputers. What some other firms label *small systems* has been included in INPUT'S midsize category.

The $4.3 billion total for FY88, which also includes telecommunications equipment and systems software, represents a slight reduction from the $4.5 billion figure that INPUT provided at INPUT'S federal conference in June 1988. This change arose from the following factors:

- Several major hardware procurements, expected to be awarded in FY1988, have been delayed by protests. In the past year, the General

Services Board of Contract Appeals (GSBCA) has experienced an unprecedented level of protest activity. Protests slowed numerous procurements.

- Higher than expected salary expenses in many federal agencies are causing a reduction in many program areas, including information systems. Recently, Congress approved a 4% pay raise for FY1989, without appropriating any additional money. Thus the agencies must absorb the pay raise by cutting other areas, including information systems. Some of the systems subject to cuts include the SEC's EDGAR project, administrative systems at the Department of Transportation, Agriculture's Field Office Communications Automated System, and various systems at Justice's Immigration and Naturalization Service.

Despite the near-term cut, INPUT has not changed its overall estimate for 1993. The forces driving this market remain largely in place. Therefore, with a lower base, INPUT has raised its growth rate forecast from 5% to 6%.

The lower growth rate of large-scale systems, when compared with the growth rates for the other categories, stems in part from the following factors:

- GSA is currently discouraging agency "grand designs" because of their associated cost, duration, and visibility. This discouragement will result in some agencies' acquiring more modest systems and meeting their "grand design" requirements in a more modular fashion.

- Supercomputers, while growing sharply, will continue to represent a fairly small percentage of the large-scale market.

- Many functions formerly performed only on mainframes are now going to midsize systems. The concept of departmental computing is growing in popularity, as organizations within an agency may gain more control over their own resources.

- Remote computing services, although not declining in an absolute sense, will continue to decline as a percentage of the federal budget. Agencies will replace these remote services with more local-area networks for microcomputers and midsize systems. The ready availability of these smaller systems will decrease demand for large-scale systems.

- Finally, mainframes have become too expensive for many midsize agency activities. With continuing budget constraints, many agencies will opt for more cost-effective solutions, even if these solutions involve giving up some functionality.

C
Federal Market Issues

1. Federal Policies and Regulations

The federal midrange systems market is subject to a wide variety of federal policies and regulations. Due to the sheer number of regulations, both agencies and vendors face difficulties in understanding and compliance. Earlier, federal ADP and telecommunications systems were procured and managed for more than two decades by the FPRs, FPMRs, and ASPRs. ADPE and services procurements were modified by the 1966 Brooks Act and subsequent amendments.

The Office of Federal Procurement Policy (OFPP) was created in 1976 to develop a single procurement code and uniform procedures for the federal government. For example, the OFPP developed OMB Circular A-109 for major systems acquisitions, including ADP systems. A-109 is still in effect, but only for larger ($100-$500 million) contracts or the acquisition of controversial systems. In recent years, OMB Circular A-109 has been waived or sidestepped, even for large procurements.

The Paperwork Reduction Act of 1980 includes a number of provisions concerning information resource management and system acquisitions. The act:

- Created the post of Information Resources Management in each department and major agency

- Placed all but sensitive and mission-essential ADP under a new "mini-Brooks Bill"

- Provided a separate approval procedure for national security and defense mission ADP

- Authorized annual preparation and publication of a Federal Agency Five-Year Plan for major ADP/Telecommunications Acquisition by OMB and GSA

Under the authority of the Federal Administration Act and the Paperwork Reduction Act, GSA prepared and made effective in April 1984 a new regulation for information resources. The Federal Information Resource Management Regulation (FIRMR) superseded the FPR and FPMR in information technology areas. FIRMR combined in one regulation the acquisition, management, and use of all ADP and telecommunications not covered by separate statutes for reasons of sensitivity. FIRMR was initially based on the related sections of the FPMR and the FAR, as well as related provisions of DARC and CAAC-originated FAR amendments. GSA intended that the FIRMR would streamline the information resources acquisition process. GSA is now rewriting the FIRMRs to

reflect significant legal and regulatory changes. At this writing, a new draft of the FIRMR has been issued by the GSA for agency and industry comment.

Other regulations and policy initiatives that are changing the acquisition procedures include:

- The Competition in Contracting Act (CICA) of 1984, which provides expanded legal powers for ADP protest action via the GSA Board of Contract Appeals (GSBCA) and GAO, increases the opportunity to employ negotiated contracts, and establishes seven more-restrictive categories of exceptions that permit sole-source awards. Agencies view the CICA as allowing vendors to complicate and lengthen the acquisition process. The act's provisions make it easier for vendors to protest procurement activities, and to bring temporary halts to procurement schedules.

- The Paperwork Reduction Reauthorization Act of 1986 expanded the power of the GSBCA, but also retained the Warner Amendment, which provides DoD with mission-critical ADP procurement exemptions to Brooks Act coverage, except for application of general-purpose ADPE in noncritical functions, such as testing, recalibration, and programmer workbenches.

Several issues have arisen and are now being studied. These include software rights, data rights, and second-sourcing of some systems. IN-PUT expects these issues to continue to create problems on some procurements.

As is well known in the vendor community, the CICA has not achieved what was expected. It was expected to improve competitive opportunities, while the GSBCA provided more equitable resolution of protests. The results have been anything but equitable. Today, virtually all major procurements are protested. A new word has entered the federal procurement vocabulary—fedmail. Some agencies and winning vendors are providing payments to protesters in order to secure withdrawal of the protest. As a result, a new growth industry is developing for lawyers specializing in federal procurement.

Other GSA procedures, aimed at facilitating the procurement process, have led to successful protests. Under the ongoing "Go for 12" program and the more recent "Trail Boss" concept, GSA is attempting to accelerate key procurements by authorizing acquisitions by prequalified experts without extensive management reviews. Thresholds have been raised, Agency Procurement Requests (APR) have been simplified, and delegation turnaround has been speeded up.

The above procedures have led to problems. Most successful protests result from one or more of the following factors:

• Procurement process inconsistencies
• Improper documentation
• Defective pricing
• Inconsistent information dissemination

This limited procurement review has eliminated much of the expert examination of procurement actions. Many vendors now believe that more review is needed. Some have even indicated that, in certain circumstances, losing can be more profitable than winning.

Another policy issue in the federal arena is whether to downsize the "Grand Design" approach to procurements. In a draft GSA report released in July, 1988, the suggestion to adopt a modular approach or divide procurements for systems into smaller pieces was discussed. The report's recommendation comes from interviews with individuals involved in ten Grand Design systems and outlines these systems' shortfalls and problems. Exhibit III-5 is a table from the report that summarizes these issues. The report cites some valid criticisms of the grand design approach to procurements. However, many of the criticisms can also be applied to the modular approach. Planning, personnel training over time, coordination problems, funding, and interoperability are required by both approaches to be successful. Grand design and modular projects must in the end be tied together into integrated systems. The real difference between the two approaches appears to be the contract vehicle. The report is still generating industry and government comments on whether the modular approach will work efficiently and what effect, if any, downsizing will have on system integration contractors.

One other issue will bear watching in 1989. At this writing, Congressman Jack Brooks of Texas is expected to take over the Chairmanship of the House Judiciary Committee. He is to be replaced on the House Government Operations Committee by Congressman John Conyers of Michigan. Although nothing is likely to change in the first six months, there may be some, as yet unspecified, redirection of policy after that. For example, Representative Conyers may strengthen the Small and Disadvantaged Business Set-Aside Program, as it relates to federal IRM.

EXHIBIT III-5

TEN ISSUE AREAS THAT HAVE THE MOST EFFECT ON GRAND DESIGNS

1. Coordination problems within the agency during the planning phase

2. Procurement problems during the procurement phase

3. Lack of acquisition skills during the planning and procurement phases

4. Placing the program high enough in the organization in the planning phase

5. Uncertain funding during the planning phase

6. Audits by GAO during planning and procurement phases

7. Problems with contractors during procurement

8. Staffing problems during planning, procurement and operations

9. Problems with procurement regulations during the procurement phase

10. Unrealistic time schedules during the planning phase

Source: Table 2 *Draft Report, An Evaluation of the Grand Design Approach to Developing Computer-Based Application Systems,* GSA, Information Resources Management Service, July 1988

2. Budgetary Constraints

Future-year funding of current acquisition programs and approval of funding for the next budget year are always in doubt in the federal government market. The authorization of an agency budget and the requested information resources by the agency oversight committee do not assure the agency or vendors that funds will be provided in the out years. Appropriation Acts for the agencies approve the TOA (Total Obligational Authority) for certain large systems, but not the fiscal year or years in which the funds will be available (called outlays).

Continuing economic and political sensitivity to the large national budget deficit could negatively impact a number of acquisitions in the "less than critical" defense and civil technology sectors. Presidential election years (1988) often imply budgeting for political, not practical, reasons, thereby leading to budget cuts in FY1989. Major ADP systems already approved are likely to continue in preference to unapproved programs.

Major civil systems affect service to the public and have greater political appeal than research programs. Deficit control measures, especially those under the Gramm-Rudman-Hollings (GRH) Act, could force agencies to cancel programs that do not meet stringent productivity improvement requirements and, in some cases, delay or stretch those that do. However, Congress appears to be backing away somewhat from the GRH targets, and most agencies have not yet experienced any major effect from the Act.

Systems acquisitions in the second half of the 1980s have been addressing needed improvements in management, administration, human resources, and logistics functions that have not received newer data processing resources in more than a decade. Administration decisions require complete data on domestic issues and regulatory affairs in order to satisfy congressional mandates. Agency executives need trend analysis and status reports that accurately portray funding, staffing, and performance progress against mission objectives. Required are accurate, up-to-date information management systems. The public too is pressing for solutions to delays and errors in processing payments and solutions to delays in satisfying information requests. Therefore, federal vendors will need to provide new and innovative products and services to satisfy this perceived federal need.

INPUT expects budget difficulties to continue to constrain the federal information systems market, regardless of who wins the election. However, if the procurement process is simplified to reduce the protest volume, acquisitions should begin to increase. Many view informations systems as key to productivity increases. Therefore, budget constraints sometimes lead to increased opportunities in the information systems market.

3. Computer Obsolescence

The issue of the federal government's computer systems obsolescence was recently highlighted by a report issued by GSA. The study entitled *Computer Obsolescence: Federal Government and Private Sector, November, 1987*, concluded that the federal sector significantly lags behind the commercial sector in terms of computer age and equipment capacity.

Specifically, the study reported that the average age of computers (all categories) in the federal government lagged behind the private sector by 3 years and 7 months in 1986. For midsize computers, or GSA's medium computer classification, the average age exceeded the commercial sector by 4 years and 4 months. In fact, the average age for midsize systems has actually increased from 8 years, 1 month in 1984 to 10 years in 1986. GSA believes that the reported average age for midsize systems will continue to grow, whereas the average age for large-size systems will decrease. It was not believed that this is necessarily the result of fewer midsize systems being replaced or added, but due to the difficulties encountered by GSA in obtaining valid inventory data for medium and smaller systems. If the GSA improves its data collection and verification measures by 1993, it would most probably find that the average age of medium-scale computers has become significantly lower than reported in 1986. The GSA would also no doubt discover that there is much more old hardware still being used. The forces driving this market (such as federal ADP modernization, decentralized computing, OSI products, and technology advances) will no doubt increase the numbers of newer midrange systems in the federal sector.

4. Software Integration and Productivity Improvements

Software is the interface medium between machines, applications, and end users. Agencies need strategies and vendor support to implement these integrations. Agency respondents noted a growing need for portable software that is readily adaptable to a changing hardware environment. As new hardware technologies are put in place, the next generation of software must accommodate change and communications between incompatible equipment.

Similarly, agencies are increasingly required to merge large applications into a single, transparent software system that fits the end users' needs, rather than end users adapting their needs to the capabilities of the software. For many midsize systems applications, easy-to-use interfaces to both mainframes and microcomputers are urgently needed.

To modernize software and effect productivity improvement, agency ADP organizations are seeking greater use of:

- Software engineering technologies, including more-efficient software management methods, software development methodologies, and data dictionaries

- Higher-level development tools, including program generators and fourth-generation languages

- Better analytic tools for all sizes of machines—microcomputers, midsize computers and mainframes—that will provide programmers

with development aids such as automatic documentation, cross-referencing, etc. Agencies also require improved system software for supercomputers.

One approach, data administration, provides techniques and software tools to manage large amounts of data. By organizing, indexing, and cross-referencing data according to the business requirements of the organization, agencies are better equipped to plan procedures for the comprehensive development of future systems. Specifications from the American National Standards Institute (ANSI) are now being reviewed by agencies and vendors. Although a standard data dictionary software specification is some years away, vendors, especially of data base management systems (DBMSs), need to be cognizant of the pending impact of this trend. Historically, midsize systems have lagged behind mainframes in DBMS technology.

Fourth-generation languages (4GLs) are being employed by agencies to increase productivity in software development and maintenance. Currently, 4GLs are used primarily for end-user computing and reports, along with some decision support. Other applications for 4GLs are being designed and will eventually ease the burden on agency staff and computer resources.

It has often been documented that 4GLs increase, sometimes sharply, equipment resource requirements. This increase comes from the inherent inefficiency, in a machine sense, of most 4GLs. As new software technology becomes available, agencies will likely optimize their code and increase machine efficiency. This increase in efficiency could serve to dampen the growth in demand for midsize systems.

5. Artificial Intelligence

Artificial intelligence is a market segment in which vendors are focusing on introducing new technology to the government, primarily in the areas of software development efforts and decision support. Currently, expert systems are being developed by agencies as standalone end-user production systems to automate knowledge-based processing.

The DoD is taking the lead in developing artificial-intelligence programs. AI is providing useful training for analysts, and applications are being employed in tactical situations and support functions. Civil agencies are also developing and operating expert systems for large-scale information processing. INPUT believes that decision support systems represent the most common government application of AI, based on various other studies of federal software.

Industry views the current AI opportunities to be in product-oriented services for prototyping systems for the federal agencies. As in other

software areas, the government is looking to industry for solutions, not just products. Therefore, in response to this trend, AI vendors will migrate beyond standalone systems to new products that integrate approaches and solutions. AI will develop closer links to the main flow of an agency's information processing.

Many small AI vendors are focusing their marketing efforts on MIS directors when providing products to facilitate information storage and retrieval, data communication, and other MIS functions. Current federal prototyping efforts are demonstrating AI feasibility in those MIS functions as well as other decision support areas. Areas in which federal workers must interview the public seem especially promising for AI. INPUT also found that many federal AI applications were being applied to specialized midsize computer systems.

D

Federal Midsize Hardware Vendors

DEC hardware has the major portion of the midsize system installed base (50%), with a purchase value estimated at 57% of the total value of all vendors' systems. Data General has 10% of the installed systems, and the purchase value was also estimated higher at 13%. Ranked third were IBM and Sun Microsystems. The purchase values for both of these vendors' systems account for only 3% (each) of the value for all installed midsize systems at government agencies. Vendors' federal market shares for both the number of installed systems and their purchase values are shown in Exhibits III-6 and III-7.

The federal market mirrors DEC's dominance in the commercial market. IBM appears to have failed to make much of an impact with its 9300 series systems due to a lack of compatibility with other systems. Further, the fact that IBM's value share is only half its volume share (3% versus 6%) suggests that many older IBM systems remain in the federal inventory. It remains to be seen whether the AS/400 Silverlake series will fare any better than the 9300 series in the federal market. Federal midsize computer systems must be able to communicate with larger and smaller systems. If the AS/400 can demonstrate interoperability and handle portable applications, no doubt it will show a favorable presence at government sites.

EXHIBIT III-6

VENDOR SHARE OF INSTALLED MIDSIZE SYSTEMS
Percentage by Number of Systems
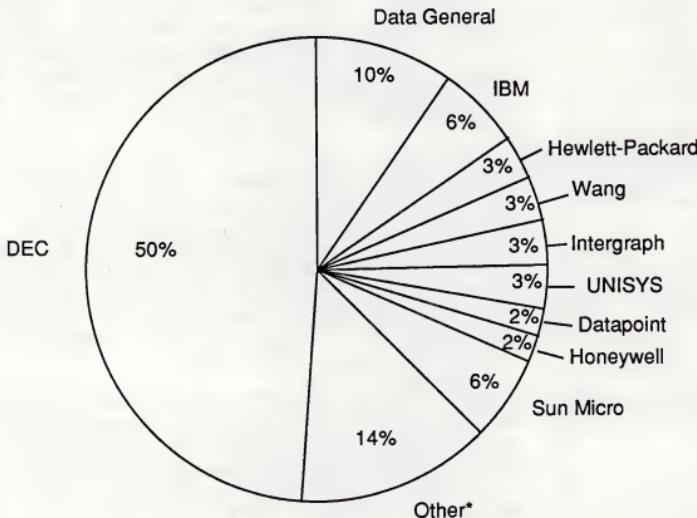
Data General

10%

IBM

6%

3% — Hewlett-Packard

3% — Wang

DEC   50%

3% — Intergraph

3% — UNISYS

2% — Datapoint

2% — Honeywell

6%   Sun Micro

14%

Other*

Source: Computer Intelligence, September 1988

*See Appendix G for a list of vendors in this category.

EXHIBIT III-7

VENDOR SHARE OF INSTALLED
MIDSIZE SYSTEMS
Percentage by Purchase Value of Systems

Data General

13%

Wang

5%

Prime

3%

IBM

3%

Sun Micro

3%

Hewlett-Packard

2%

Unisys

2%

Harris

2%

Honeywell

1%

DEC 57%

Other* 10%
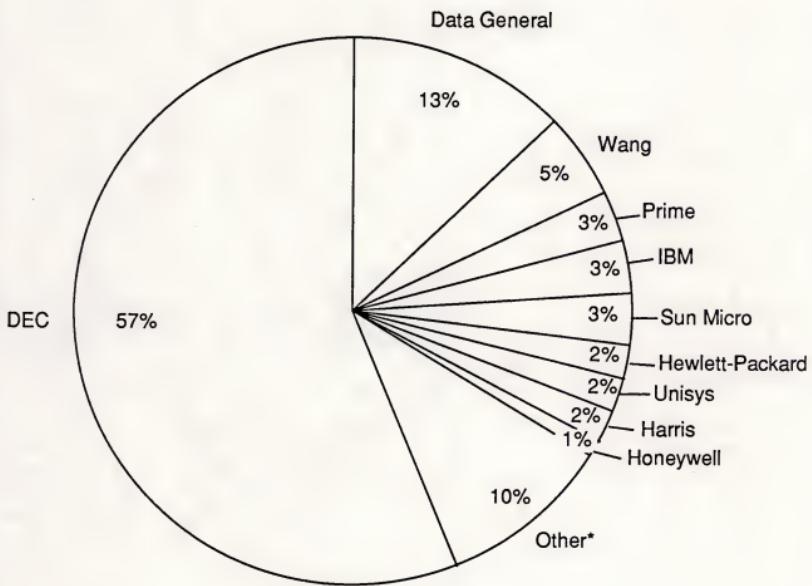
Source: Computer Intelligence, September 1988

*See Appendix G for a list of vendors in this category.

IV

Agency Requirements and Trends

Midrange computer systems are playing an increasing role in the modernization of federal information processing. Such systems are becoming essential to support agencies' missions for various ADP and office automation functions through the systems' technological versatility and cost-effectiveness.

This section of the *Federal Midsize Market* Report will:

- Identify user requirements for hardware and software

- Isolate the policies and regulations that have specific impact in this market

- Discuss user preferences for vendors, contract vehicles, and contract selection criteria

A

Installed Midsize Systems

Federal agencies exhibit a wide range of installed midrange computer systems. The range of systems mirrors the constantly changing market perception. Evolving technology enables the upgrade of existing systems, as well as the development of new, more powerful, yet smaller systems. The classifications used for mainframes, minicomputers, and micros are becoming increasingly meaningless. The traditional labels no longer connote hardware capability. Exhibit IV-1 lists a sample of the computer manufacturers and models cited by federal agency respondents.

Agencies were asked to estimate the existing number of midsize computer systems that were installed. On average, there were 53 per surveyed federal organization. The estimates ranged from as low as 4 to as high as 150.

EXHIBIT IV-1

SAMPLE OF CURRENTLY INSTALLED MIDSIZE COMPUTERS AT RESPONDENT AGENCIES

Manufacturers	Model Numbers
IBM	43XX, 93XX
UNISYS	5000/80
Harris	H700
DEC	VAX 8200-8600
Data General	Unknown
Hewlett-Packard	HP 1000s, HP 3000s, HP 9000s
Honeywell	Unknown
Gould	Workstations
Sun Microsystems	Sun 3
Wang	VS 7100
Texas Instruments	Unknown
Xerox	Unknown
Tandem	Unknown
Prime	Unknown

*Average number of systems per respondent: 53

B

Decentralized
Processing Role

Midrange computers, or minicomputers, play a vital role in the increas-
ingly decentralized and networked environments in user organizations.
The federal user community is demanding powerful shared resources that
can handle a myriad of departmental and data center functions. The
variety of applications that agencies are currently running include:

- Traditional office automation
- Graphics
- Personnel
- Administration
- Project management
- Science/engineering
- Management
- Information analysis

INPUT's analysis showed there were some major differences between the
types of applications run by the DoD and the civil agencies:

- Civil agencies (see Exhibit IV-2) targeted human resource/payroll (3x)
  and management system applications (2x) more frequently for midsize
  operations.

- The absence of graphics, logistics, and distribution applications at civil
  agencies suggests there is no current need for these applications in the
  midrange environment.

- At the Defense agencies (see Exhibit IV-3), graphics applications are
  run with considerable frequency. DoD midsize systems are also being
  used more frequently as departmental file servers for word processing
  and electronic mail applications.

- Specific technical applications, such as those identified as scientific,
  made up a rather small portion of applications run at civil and DoD
  agencies.

The lack of responses to our question on the types of applications agen-
cies planned for their new midsize systems prevents us from drawing any
conclusions on the differences between current and planned systems
usage.

The majority of federal government agencies surveyed by INPUT indi-
cated they were not running standalone systems. Systems interfaced as
frequently to larger and smaller systems. Eighty percent of the agencies
indicated their midrange systems were communicating to both mainframe
and smaller systems.

EXHIBIT IV-2

**MIDSIZE SYSTEMS APPLICATIONS AREAS
FOR CIVIL AGENCIES**

- Word Processing 13%
- Electronic Mail 9%
- Electronic Publishing 9%
- Accounting 13%
- Human Resources 13%
- Information Analysis 6%
- Scientific & Engineering 6%
- Administrative 9%
- Project Management 6%
- Management Systems 16%
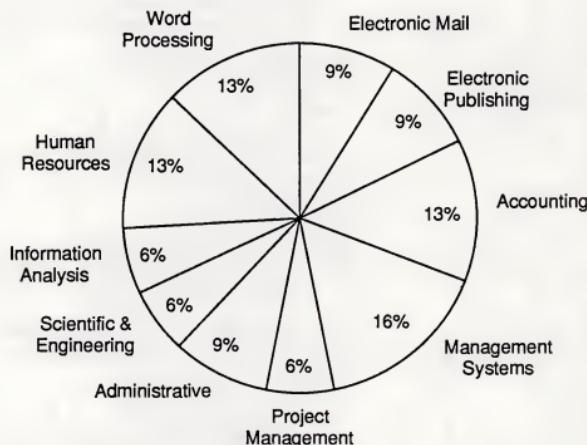
EXHIBIT IV-3

**MIDSIZE SYSTEMS APPLICATIONS AREAS
FOR DEFENSE AGENCIES**

- Word Processing 16%
- Electronic Mail 12%
- Electronic Publishing 8%
- Human Resources 4%
- Graphics 12%
- Information Analysis 8%
- Scientific & Engineering 4%
- Accounting 8%
- Administrative 4%
- Project Management 4%
- Logistics 12%
- Management Systems 8%
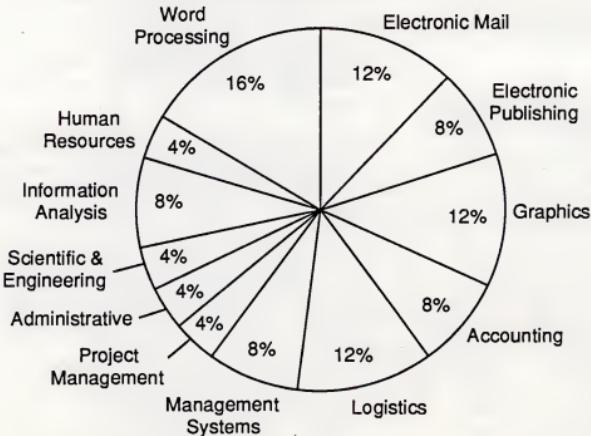
Exhibit IV-4 lists the range of interface methods, and the media employed to accomplish the connectivity to other systems in integrated environments. Agencies linked their terminals, workstations, and personal computers to their departmental midrange systems, and to their larger data center systems. Current connectivity methods included LANs, WANs, terminal emulation, DDN, and dedicated networks.

EXHIBIT IV-4

**COMMUNICATIONS TO LARGE
AND SMALL SYSTEMS**

Systems
Interfaces

Methods　　　　Media

Hardware
COAX
Tape/Disk
LANs　　　　　　　PBX
WANs　　　　Dial Backup
DDN
Emulation　　　SNA
Dedicated Networks　Modem
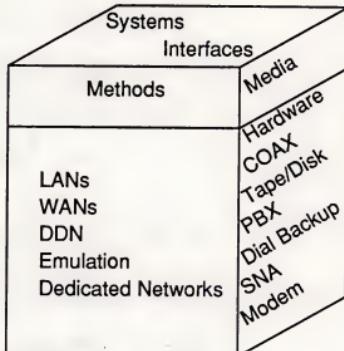
How Important is UNIX?

Agencies were asked to rate the necessity of employing UNIX as an operating system on their midsize systems through FY1993, as shown in Exhibit IV-5 . Not surprisingly, UNIX was rated higher by the DoD than the civil agencies, as the DoD will be adopting the FIPS for POSIX (Portable Operating System Interface for UNIX). Many civil agencies—including Commerce, Agriculture, Justice, and the Veterans Administration—have not standardized on UNIX, and as yet some have no plans to do so. However, if they later opt for any UNIX-like systems, they will be required to observe the POSIX standard.

EXHIBIT IV-5

NECESSITY OF EMPLOYING UNIX FOR MIDSIZE SYSTEMS OPERATIONS
FY 1988 - FY 1993

Agency Type	UNIX Necessity Rating*
DoD	3.67
Civil	2.7

0   1   2   3   4   5
None   Extreme

* Total average rating by all respondents: 3.0
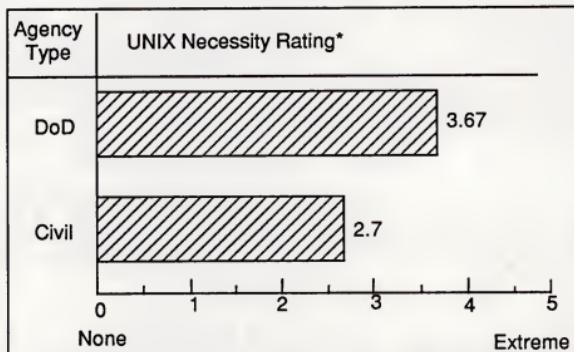
The overall average score of 3.0 (based on a 1-5 scale) indicates that native UNIX, and its associated flavors, were not viewed by agencies as critical to their planned software environments. Twenty percent of INPUT's agency sample rated it of "no necessity at all." Only a few respondents mentioned any software applications that must run under UNIX as shown in Exhibit IV-6: word processing, electronic mail, human resources, and accounting. This finding is very similar to the results found in a concurrent INPUT study on large systems, where the overall average necessity rating for UNIX was 2.66.

**UNIX-BASED APPLICATIONS
ON MIDSIZE SYSTEMS AT
FEDERAL AGENCIES**

Application Types
• Word Processing
• Electronic Mail
• Human Resources/Payroll
• Accounting
• Hospital System
• Window Management
• Image/Text Manipulation
• Applications to Be Ported

C
Software Selection Environment

1. Systems Software

Agencies were asked to identify the types of systems software they were planning for their midrange computer environments. INPUT has classified systems software into four broad categories: systems control, applications development/programming tools, data center management, and data base management systems. Exhibit B-2 in Appendix B includes a detailed chart depicting the types of systems software contained in each category.

How federal agencies will use systems software on their planned midsize hardware is illustrated in Exhibit IV-7. A slight variation exists on how agencies will employ systems control tools and data center management software. INPUT believes that these figures are low due to a lack of response by DoD agencies to certain questions in the questionnaire. In the systems control category, INPUT includes encryption systems and access control systems. In the data center management category, INPUT includes operations scheduling, job accounting, performance monitors, etc. One would expect the use of encryption and access control software

to be more common among DoD systems, since more classified process-
ing takes place. However, the responses did not support this conclusion.
The lower prevalence of such software in DoD systems may arise from
the fact that DoD uses other approaches to protect its data.

EXHIBIT IV-7

SYSTEMS SOFTWARE SELECTION FOR MIDSIZE SYSTEMS BY FEDERAL AGENCIES

Software Type

Systems Control — 27.8 / 22.2

Applications Development/Pro-gramming Tools — 27.8 / 33.3

Data Center Management — 16.7 / 11.1

DBMSs — 27.8 / 33.3

Percent by Agency Type (0, 10, 20, 30, 40)

Civil Agencies   DoD Agencies
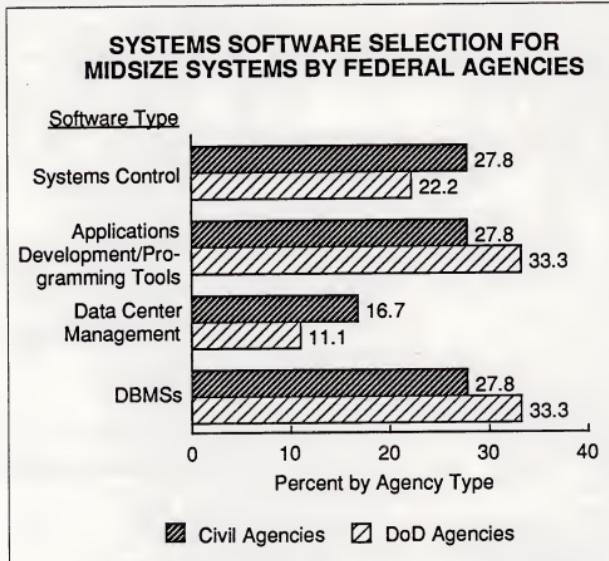
2. Applications Acquisition Methods

The types of applications selected for midsize systems will drive agency
acquisition methods for those applications, as shown in Exhibit IV-8.
Many of the required software applications are generic and readily
available. Traditional office automation software packages such as word
processing, electronic mail, spreadsheets, graphics, and data base man-
agement systems will be purchased off-the-shelf. Customization—or
modification of these applications in terms of formats, forms, and report
generators—may be contracted to either the software supplier or an
outside vendor, as will interfaces for open systems. Decision support or
management software, as well as personnel and accounting applications,
will generally need to be developed or customized by internal agency
programming staffs who understand their agencies' specific needs.
However, such habits do not rule out custom development by outside
vendors.

EXHIBIT IV-8

APPLICATIONS ACQUISITION METHODS FOR MIDSIZE SYSTEMS		
Purchased Off the Shelf	Developed/ Customized Inhouse	Developed/ Customized Outside
Word Processing Electronic Mail Spreadsheets Graphics DBMS Window Manager	Management (DSS) Personnel Accounting	Format for: Word Processing, Forms, Reporting Interfaces to Open Architecture Systems

D

Policies and Regulations

Agencies were asked to identify what impact, if any, nontechnical factors such as FIRMR, the Trail Boss program, the Competition in Contracting Act (CICA), and other government standards were having on midrange procurements. Only one-third of the respondents indicated that the FIRMR, the CICA, or standards had any effect on acquisitions of midsize systems, as shown in Exhibit IV-9. The few respondents that commented on these factors indicated that the FIRMR's regulations and the CICA were critical, but generally placed constraints on the procurement process. Agencies noted that after the passage of the CICA, vendors may file protests more easily, thereby delaying an already lengthy process. The Trail Boss Program was not perceived to have any significant impact on respondent agencies' procurements.

Vendor respondents differed in their opinion of the impact of these factors (see Exhibit V-26). Considerably more vendor respondents viewed the Trail Boss Program and the CICA as having considerable effects on how they conduct business with federal agencies. Agencies' comments on standards reflected the pervasive government mindset for standards that will provide for portable systems.

EXHIBIT IV-9

IMPACT OF FEDERAL POLICIES AND REGULATIONS ON MIDSIZE REQUIREMENTS

Policy/ Regulations	Percent Indicated Impact	Comments
FIRMR	33.3	Critical/Important to Adhere to Constrains Acquisitions
Trail Boss Program	8.3	Very Important
CICA	33.3	Critical/Important to Adhere to Delays/Constrains Acquisitions Allows Easy Protests
Standards	33.3	Employ UNIX Standard Must Establish & Use

E
Acquisition Plans and Preferences

1. System Acquisition Methods Preferences

Agency executives were asked how they planned to acquire their new minicomputer systems over the next five years, as shown in Exhibit IV-10. Sixty percent indicated they intended to buy the hardware components, and do necessary integration activities in-house. This is at odds with earlier surveys INPUT performed on the growth of the systems integration market. Another fifty percent will purchase their hardware separately, and contract a systems integrator to perform any required integration functions. Only twenty percent will select a total integrated solution from one vendor. A small percentage cited a hardware purchase only, or the use of COCO facilities. Since these responses totaled more than 100%, INPUT concluded that many respondents will be using more than one approach to meet midrange needs.

EXHIBIT IV-10

PLANNED AGENCY MIDSIZE SYSTEM ACQUISITION METHODS

Acquisition Method

Acquisition Method	Percent
Buy Hardware Only	10
Buy Integrated System	20
Buy Hardware Separately and Use Systems Integration	50
Buy Hardware Separately and Do Integration In-house	60
Use COCO Facilities	10

Percent of Responses (0, 20, 40, 60, 80)
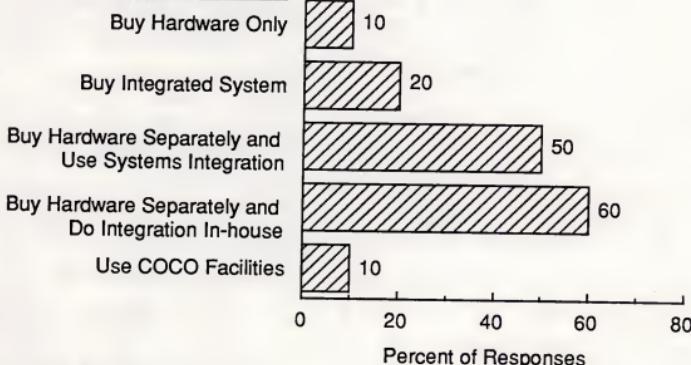
Over eighty percent indicated that they would either be upgrading their existing midrange hardware configuration, or adding additional systems through FY1993, as shown in Exhibit IV-11. However, the majority of respondents were unsure of the number of midsize systems their organizations would be adding in the next five years.

EXHIBIT IV-11

AGENCY PLANS TO ADD/UPGRADE MIDSIZE HARDWARE

Plan to Add/Upgrade?	Percent of Respondents
Yes	83.3
No	16.7

2. Contract Types

Agency personnel stated a majority preference for fixed-price contracts, as agencies have in other INPUT studies. Respondents generally believe that this type of contract encourages vendors to complete projects on time and within budget. Fixed-price contracts place the responsibility of a project on the contractor, and are generally used when requirements are well defined (see Exhibit IV-12). Thirty percent indicated a preference for a "mix" of contract types, recognizing that a "systems" requirement should dictate the contracting vehicle.

EXHIBIT IV-12

AGENCY CONTRACT PREFERENCES FOR MIDSIZE PROCUREMENTS

Contract Type Preference	Percent of Respondents	Reasons Cited
Fixed-Price	60	Cost Control Ease of GSA Schedule Previous Experience Requirements Well-Defined for Vendor
Fixed-Fee	10	Reduces Risk
Mixed/Other	30	Depends on Systems

3. Preference for Types of Vendors

Responding agencies were also asked to rank the type of contractors they would prefer for their midsize procurements. As shown in Exhibit IV-13, hardware vendors were ranked first, with systems integration contractors following second. Surprisingly, software manufacturers were ranked third. Aerospace division and not-for-profit organizations were the least-preferred type of vendors. Vendor perceptions of agency preferences are shown for comparison, an indication that vendors are not fully cognizant of their market's preferences.

EXHIBIT IV-13

AGENCY PREFERENCES FOR
MIDSIZE SYSTEMS CONTRACTORS

Type of Contractor	Agency Preference by Rank	Vendor Perception Rank
Hardware Vendor	1	2
Systems Integrator	2	1
Software Manufacturers	3	5
Professional Service Firms	4	5
Aerospace Divisions	5	4
Not-for-Profit	6	6

Agency personnel were also asked to identify the major vendors in this market segment. Respondents identified Digital Equipment Corporation (DEC) and Hewlett-Packard as the major players. Agencies' perception of DEC's dominance was not a surprise, but their recognition of Hewlett-Packard as a major vendor in this market was. Computer Intelligence's federal equipment inventory does not place Hewlett-Packard as a principal supplier of midrange systems. Data General, Prime, Wang, and IBM were rated as second, with the remaining vendors receiving fewer mentions, as listed in Exhibit IV-14.

4. Selection Criteria

The relative ranking of midrange contractor selection criteria is shown in Exhibit IV-15. The proposed technical solution was the primary criterion for selection by agencies. Costs in general continue to be important selection criteria for agencies because of budgetary conflicts encountered on the way to project authorization and funding. Life cycle cost was ranked second, and initial cost third. For the most part, respondents did not differentiate between the initial and life cycle costs of a procurement. Contract type and risk containment procedures were perceived as having little or no importance in selection criteria for midrange systems contracts.

EXHIBIT IV-14

PERCEPTION OF IMPORTANT MIDSIZE COMPUTER VENDORS

Vendors	Rank*
Digital Equipment Corporation	1
Hewlett-Packard	1
Data General Corporation	2
IBM	2
Prime	2
Wang	2
Control Data Corporation	3
Gould	3
Masscomp	3
Sun	3
UNISYS	3

*Rank based on number of mentions.

EXHIBIT IV-15

RELATIVE RANKING OF CRITERIA USED IN SELECTION OF MIDSIZE SYSTEM VENDORS

Selection Criteria	Agency Rank	Vendor Rank
Technical Solution	1	1
Life Cycle Cost	2	2
Initial Cost	3	4
Contract Type	4	5
Risk Containment	4	3

Vendors agreed with agencies in selection of the technical solution and life cycle cost as the most important criteria for contractor selection.

F
Vendor Performance

1. Characteristics of a Successful Contractor

Agencies were asked to rate vendor characteristics that influence their award decisions. For this study, INPUT refined its categories to differentiate between the products/services "offered" by a vendor, and vendors' "actual experience" with products/services. Agencies selected systems software experience as their primary selection criterion, followed closely by hardware experience, vendor support experience, staff experience, and delivery schedule. All characteristics were rated as having approximately average importance, as shown in Exhibit IV-16. There seems to be little difference between the characteristics of successful midsize contractors versus large-scale systems contractors, as evidenced in a recent INPUT report on large-scale systems.

DoD and civil midrange respondents differed in their relative emphasis on various characteristics. DoD agencies rated vendor support experience highest, whereas civil agencies gave it somewhat less importance. Vendor location has little impact on award decisions, as evidenced by its low ranking by DoD, civil agencies, and vendors—as seen in Exhibit IV-17.

EXHIBIT IV-16

AGENCY RATING OF SUCCESSFUL
VENDOR CHARACTERISTICS

Vendor Characteristics

Vendor Characteristics	Rating
Vendor Location	2.8
Applications Offered	2.9
Integration Experience	3.3
Agency Experience	3.4
Systems Software Offered	3.4
Hardware Offered	3.6
Applications Experience	3.6
Delivery Schedule	3.8
Staff Experience	3.8
Vendor Support Experience	3.9
Hardware Experience	3.9
Systems Software Experience	4.0

Agency Rating*
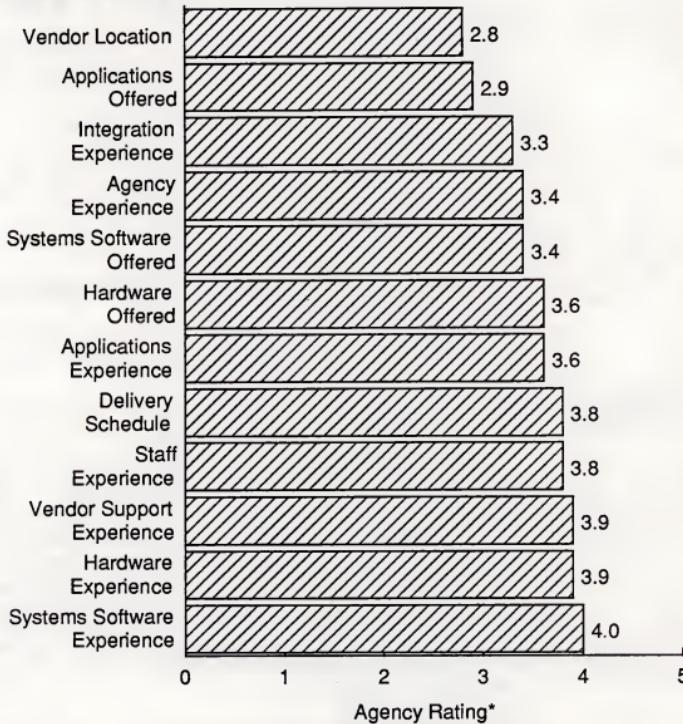
* Rating: 1 = No Influence; 5 = Critical Influence

EXHIBIT IV-17

RANKING OF SUCCESSFUL
VENDOR CHARACTERISTICS

Characteristic	Ranking		
	DoD Agencies	Civil Agencies	Vendor Perceptions
Applications Experience	5	2	1
Applications Offered	(6)	8	3
Integration Experience	3	7	5
Staff Experience	3	2	6
Hardware Experience	2	3	7
Hardware Offered	3	5	4
Vendor Support Experience	1	4	2
Systems Software Experience	3	1	4
Systems Software Offered	4	6	4
Agency Experience	4	5	2
Vendor Location	(6)	(9)	(8)
Delivery Schedule	2	4	4

☐ = Most Successful

◯ = Least Successful

Industry respondents' views show that applications experience was ranked first, followed by agency and vendor support experience. The findings suggest that vendors should pay closer attention to what agencies believe are the characteristics of a successful vendor. DoD agencies place a higher priority on some characteristics than do civil agencies and vice versa.

2. Agency Views on Teaming Relationships

When queried on the past success of their vendors' teaming relationships, agency respondents did not show any indication that they were extremely successful, nor were they extremely unsuccessful. The average overall rating for teaming relationships was 3.37, based on a 1-5 rating scale, where five indicated "extremely successful." Agencies did have a few suggestions on how vendors should improve their future teaming relationships, as listed in Exhibit IV-18. "Improved overall communications" seems to summarize their views and has often been suggested in other INPUT studies.

EXHIBIT IV-18

AGENCY SUGGESTIONS FOR IMPROVED TEAMING RELATIONSHIPS

- Improve Communications between Vendors

- Need Prior Working Relationships

- Establish Mutual Standards/ Responsibilities

- Allow Agencies More Contact with Subcontractors

3. Agency Suggestions for Improved Vendor Services

INPUT also asked federal agencies to suggest ways in which vendors could better increase services and improve responses to federal requirements. Most agency suggestions were technical in nature, dealing with support areas and proposal generation, i.e., responding to the functional requirements. Agency respondents did not mention standards adherence as a suggested improvement for the vendor community, as INPUT had expected. As Exhibit IV-19 shows, agencies did suggest many areas in which vendors could and should do better. The agency suggestions are further evidence of the increasing trend for agencies to rely on vendors to provide total technical responsibility for systems projects. Total respon-

sibility is in response to increased agency productivity pressures, and further constraints on agency resources. INPUT believes these pressures will continue and will foster increased agency expectations from vendors.

EXHIBIT IV-19

AGENCY SUGGESTIONS TO IMPROVE VENDOR RESPONSE TO FEDERAL INFORMATION SYSTEMS NEEDS

- Improve Proposals

- Understand Functional Requirements

- Spend More Time Complying with Government Regulations

- Spend Less Time Complaining

- Volunteer Capabilities

- Improve Support Functions

- Learn Specific Agency Cultures

- Provide Highly Trained Personnel

- Structure Proposals to Take Advantage of New Technology

- Provide Reliable Hardware, Software

G
Trends

1. Technology Impact

Agency respondents were asked if they perceived any technology changes having an impact on their midsize systems acquisitions in the next five years. Seventy-eight percent agreed that technology innovations were having an impact on planned systems. Exhibit IV-20 lists the technology changes mentioned by agencies. Respondents expect LAN technology to significantly affect this market. Not only are midrange systems linked in LAN environments to small micro-based systems, but the performance of smaller midsize systems is threatened by the arrival of

the 80386 chip. Personal computer LAN environments based on 80386 chip technology will rival the power of traditional smaller midsize systems. Improved hardware capabilities across all categories of machines will significantly lower the costs per user.

EXHIBIT IV-20

TECHNOLOGY ADVANCES AFFECTING THE MIDSIZE MARKET

Technology

Proliferation of LANs	50
High-Performance Hardware	50
Better Software	17
Improved Telecommunications	33

Percent of Responses (0, 10, 20, 30, 40, 50, 60)
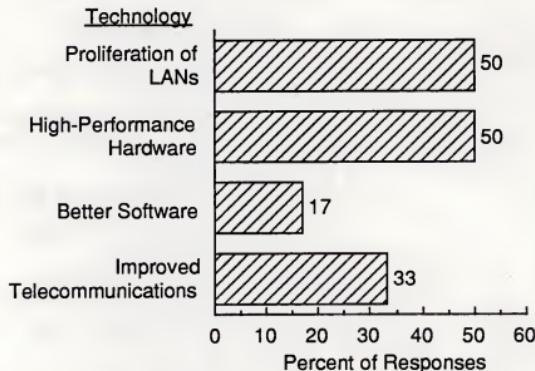
2. Federal Budget Effects on the Midsize Market

In a somewhat surprising finding, forty-two percent of the surveyed agencies did not believe federal budget cuts or constraints were impacting their midrange systems needs through FY1993, as Exhibit IV-21 shows. Another eight percent revealed that high-priority missions were not affected at all. Only twenty-five percent stated that the number of acquisitions was actually cut, and another twenty-five percent saw budget constraints as just delaying the acquisition process. This suggests that many agencies are escaping the DoD freeze, and other budget constraints directly attributable to the Gramm-Rudman-Hollings Act. The data also confirm that there are more opportunities for midsize systems acquisitions than may exist for other information technology procurements. Midrange systems are viewed as less expensive alternatives to increased data processing requirements.

In contrast, a high proportion of vendor respondents, sixty-five percent, foresaw federal budget constraints as affecting this market segment both positively and negatively (see Exhibit V-28).

EXHIBIT IV-21

EFFECTS OF FEDERAL BUDGET
CONSTRAINTS ON THE MIDSIZE MARKET

Percent of Respondents	Effects
25	Restricts Number of Acquisitions—Some Cancelled
25	Longer Process
8	High-Priority Missions Not Compromised
42	None

V

Competitive Trends

A
Vendor Participation

1. Industry Leaders in the Federal ADP Equipment and Service Market

A four-year trend analysis is compiled in Exhibit V-1. The anaylsis depicts federal contract awards for ADP equipment and services to selected hardware vendors for fiscal years 1984 through 1987. The amounts reflect obligations for contracts awarded in that year to prime contractors. The top seven contractors were selected for presentation based on the highest dollar values for award obligations in FY87. These values are not to be interpreted to reflect total sales revenues for any specific category of equipment offered by these companies, i.e., mainframes, midsize systems, and microcomputers.

UNISYS has reclaimed the lead from IBM in 1987 in terms of receiving the largest share of obligated dollars for federal ADP equipment and services. Following these two strong federal vendors is Digital Equipment Corporation. IBM, DEC, Hewlett-Packard, and Data General also received a smaller federal market share for ADP equipment and services in 1987 than they received in 1986. Vendors that increased their federal contract obligations in this area were UNISYS, Gould, and Prime.

2. Vendor Respondent Characteristics

Industry respondents in INPUT's study represented some of the largest vendors in the midrange systems market as shown in Exhibit V-2. The average corporate revenue for all participants was $2,676 billion. One-third of all vendors had corporate revenues in excess of $1 billion.

EXHIBIT V-1

SELECTED HARDWARE VENDORS
FEDERAL AWARD OBLIGATIONS
ADP EQUIPMENT AND SERVICES
FY 1984-1987 ($Thousands)

Company/ Prime Contractor	FY 84	FY 85	FY 86	FY 87
IBM	100,715	351,183	218,143	194,423
UNISYS	111,873	99,717	139,848	238,134
DEC	19,180	29,089	54,611	49,648
Hewlett-Packard	8,503	11,254	16,011	15,616
Gould	4,006	10,319	4,665	8,214
Data General	7,748	6,070	5,376	5,249
Prime	4,485	5,461	4,100	10,488
Total for All Contractors	867,168	1,393,007	1,559,951	2,059,929

Notes:
- Federal Contract Data for selected Federal Supply Codes for ADP equipment and services as reported for prime contractors only

- ADP equipment includes all range of products supplied to government and not limited to medium-size equipment.

Source: Federal Procurement Data Center

EXHIBIT V-2

REVENUE CHARACTERISTICS
OF RESPONDENT MIDSIZE
SYSTEMS VENDORS

Corporate Revenue* ($ Millions)	Percent
Less than $500 million	47
$500 million—$ 1 billion	20
Over $ 1 billion	33

* Average corporate revenue for all respondents: $2,676 billion

INPUT's industry sample was active in other segments of the information technology marketplace, in addition to the federal midrange market, as evidenced in Exhibit V-3. The Exhibit displays the percent of vendors' revenues derived from the federal midscale systems market. The average percent of revenue from this market for all respondents was 20.2. Fifty-five percent had derived only 1-10 percent of their total corporate revenue from the federal sector. Only nine percent obtained greater than 70% of their companies' total revenues from this market.

EXHIBIT V-3

PERCENT OF VENDOR BUSINESS IN FEDERAL MIDSIZE MARKET
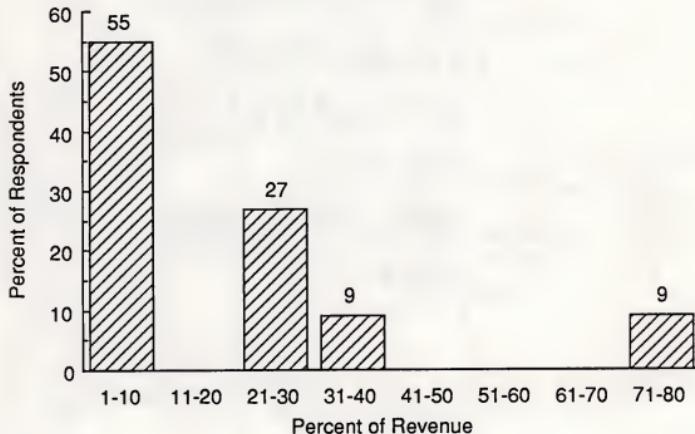
Note: Average percentage of corporate revenue from the midsize federal market: 20.2

Exhibit V-4 shows that vendors competing in this market offer many services in addition to offering midsize hardware. There are some differences between the services currently provided by vendors, and those that will be offered in the next five years. Both hardware and software maintenance services are expected to decrease at about ten percent. Programming and analysis services are also expected to be constant in response to increasing federal directives to purchase off-the-shelf software. Systems integration activity is expected to increase approximately eight percent; slight increases are expected for facilities management/operational support functions, and for midsize CPUs.

EXHIBIT V-4

TYPE OF SERVICES PROVIDED BY RESPONDENTS

Services

Service	Current	Future
Midsize CPUs	81.3	85.7
Other Hardware	50.0	50.0
Hardware Maintenance	56.3	42.8
Software Maintenance	75.0	64.3
Consulting	57.1	57.1
Systems Integration	56.3	64.3
Facilities Management/ Operational Support	31.3	35.7
Programming & Analysis	76.9	76.9
Other	20.0	14.3

Percent Offered (0, 20, 40, 60, 80, 100)

▨ Current Services   ▧ Future Services
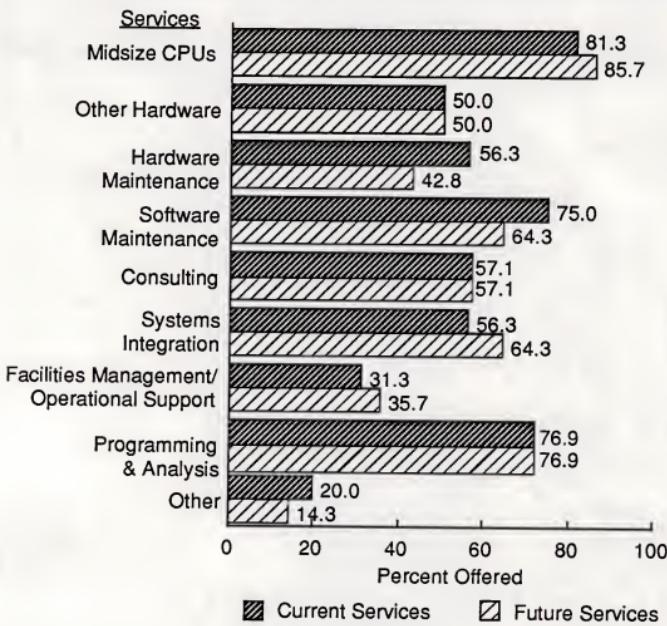
When queried as to the types of systems integration functions vendors had performed for agencies in the midsize market, vendors reported a variety of functions normally characterized as SI activities, as seen in Exhibit V-5. SI activities for midsize systems providers do not appear to differ from those provided by large-scale systems.

EXHIBIT V-5

VENDOR SYSTEMS INTEGRATION FUNCTIONS

- Systems Design

- Integration

- Operations

- Requirements Analysis

- Systems Development

- Systems Planning

- Training

- Maintenance

- Application Customization

- Hardware Acquisition

- Software Acquisition

- Integrate 3rd Party Products

B
Vendor Market
Perceptions

1. Advantages/Benefits in the Federal Midsize Market

Vendors surveyed by INPUT had wide-ranging opinions on the advantages of competing in the federal midsize market. Their responses are categorized in Exhibit V-6. The federal government move toward open standards has increased competition by restricting sole- source buys. The federal government has also fostered strategic alliances between vendors. The lower start-up costs associated with midrange systems are making these systems extremely attractive to agencies over large-size systems. This market is becoming a volume market, creating multiple opportunities due to the similarity of hardware and software configurations that can be used in a variety of situations.

EXHIBIT V-6

VENDOR VIEWS OF ADVANTAGES/ BENEFITS IN THE MIDSIZE MARKET

Advantage/Benefit

Advantage/Benefit	Percent of Responses
Cost-Effective	15
Volume Market	23
Competitive	23
Strategic Alliances	15
Other	23
None	15

Percent of Responses
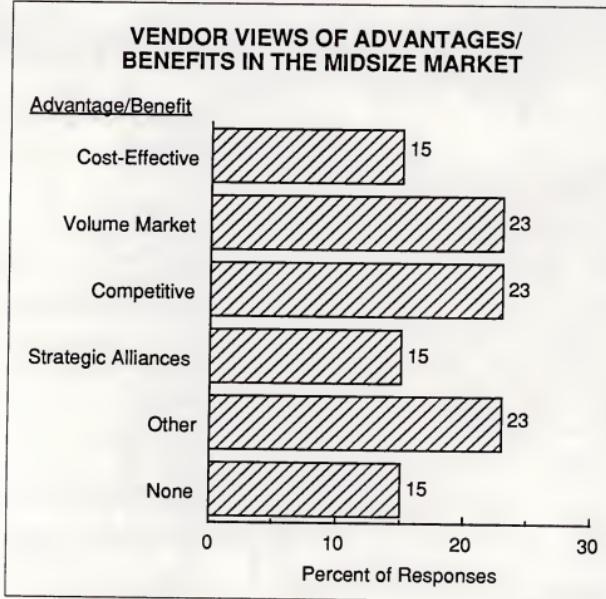
2. Disadvantages/Liabilities in the Federal Midsize Market

Vendor views of the disadvantages and liabilities of this segment of the federal marketplace also span a wide range, as shown in Exhibit V-7. The most frequently mentioned problem area was the necessity of complying with a variety of standards and proposed standards. Some proposed standards such as POSIX were not final at the writing of this report, and will inevitably be revised. Vendors expressed frustration in trying to supply products that are compliant with changing standards.

Increased competition from a variety of vendors (new start-ups, mainframe manufacturers, and small-systems companies) was ranked as the second liability of this marketplace. Federal budget constraints and adherence to federal contracting procedures tied for the third major problem of midsize systems contractors.

EXHIBIT V-7

VENDOR VIEWS OF DISADVANTAGES/ LIABILITIES IN THE MIDSIZE MARKET

Disadvantages/Liabilities	Rank*
Complying with Standards	1
Competition	2
Budget Constraints	3
Contract Process/ Regulations	3

* Rank based on frequency of mentions

Other concerns mentioned by vendors were:

• Increased custom software costs
• Large IDIQ purchases
• Integration of distributed systems and DBMSs
• Cost of sales
• Client-perceived solutions
• Smaller market for systems integration activities
• Lack of vendor alliances

3. Differences between Commercial and Federal Government Markets

Vendor respondents saw many differences between competing in the federal market versus in the commercial midsize market, as presented in Exhibit V-8. It was impossible to aggregate vendor responses due to their individuality.

Generally, the commercial market was viewed as requiring lower standards compliance. However, both the commercial and federal sectors are moving toward a convergence of standards. The commercial market was also viewed as more viable due to more growth opportunities, and because it is more sole-source oriented. The federal sector was perceived as being less valuable because of procurement regulations, standards, and less profit potential. Purchases are accomplished as solution-oriented procurements, and are not individual or piecemeal sales as they often are in the commercial sector. Vendors can play a more active role influencing the commercial purchaser, whereas vendor relationships with government purchasers are strictly controlled and monitored.

EXHIBIT V-8

COMMERCIAL VERSUS FEDERAL MARKET DIFFERENCES

Commercial	Federal
More Profit Potential	Less Profit Potential
Fewer Standards	Many Standards
More Opportunities	Fewer Opportunities
Piecemeal Sales	Functional Solution Sales
Simpler Purchasing Procedures	Complex Procurement Regulations
Vendor Influence on Purchases	Less Vendor Influence on Purchases

4. Vendor Perceptions of Agency Opportunities

Fifty-five percent of the respondent vendors sell their midrange products and services to DoD agencies only, as shown in Exhibit V-9. These vendors are missing significant civilian opportunities. Forty-five percent of the sample covers both the DoD and civil agencies as markets. A small portion of vendors did identify specific agencies or departments as the best opportunities in the midsize market: NASA, the Navy, the Air Force, NSA, CIA, Commerce, the Marine Corps, NOAA, HHS, Treasury, and Energy.

EXHIBIT V-9

VENDOR PERCEPTION OF AGENCY OPPORTUNITIES FOR MIDSIZE SYSTEMS

Agency Opportunities	Percentage of Respondents
DoD and Civil Agencies	45
DoD Only	55

5. Suggested Improvements to Products and Services

Industry respondents were asked what improvements they could make to their products and services over the next five years to make them more valuable to the federal midsize market. Exhibit V-10 lists responses.

EXHIBIT V-10

SUGGESTED IMPROVEMENTS TO PRODUCTS AND SERVICES

Improvements

Improvement	Percent
Develop Common Standards/Improve Portability	50
More Security Functions	10
Stronger Vendor Support	10
Fight Legislation	10
Improve Technical Capabilities	10
Other	10

Percent of Responses
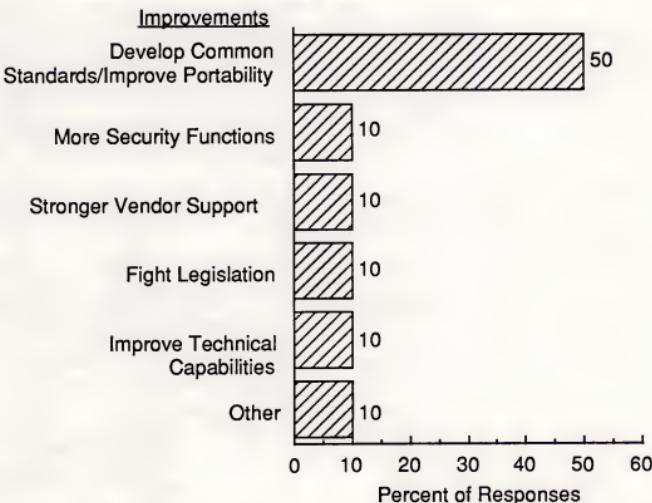
The replies varied due to the different types and levels of experience the vendors have encountered with federal agencies. The development of common standards that will improve systems connectivity was the principal suggestion made by vendors. Specifically, vendors wanted to develop a more secure UNIX, standardize their file transfer protocols, and generally comply with Federal Information Processing Standards (FIPS). Some of the suggestions made by vendors were similar to those made by agencies, as shown in Exhibit IV-19. The suggestions made by agencies and vendors can only help vendors improve their business relationships with the federal government.

6. Preferred Contract Vehicles

Vendors participating in the federal midsize market sector provide services under a variety of contract vehicles:

- Cost-plus contracts provide for vendor costs to be paid and a fee added that is either negotiated (cost-plus-fixed-fee) or based upon the performance of the contractor in satisfying the contract requirements (cost-plus-award-fee). Cost-plus contracts regulate the margin of profit allowed, but clearly place the risk with the government.

- Fixed-price contracts commit vendors to perform and complete a contract at a predetermined price ceiling. To a significant extent, the profitability associated with a fixed-price contract is dependent upon the vendor's ability to accurately appraise, in advance, the cost of providing services, and often undercuts the price submitted by competing bidders. Successfully managing fixed-price contracts requires an extremely well-written and detailed statement of work and project scope. The risk of completion is placed on the vendor.

As shown in Exhibit V-11, midrange systems vendors prefer fixed-price contracts with federal agencies.

EXHIBIT V-11

VENDOR CONTRACT PREFERENCES FOR MIDSIZE PROCUREMENTS

Contract Type	Percent of Respondents	Reasons Cited
Cost-Plus	31	• Accommodates Changes and Problems • Low Risk
Fixed-Price	61	• Known Cost • Larger Profit Potential • Control
Mixed/Other	8	• Can Respond to Requirements

Respondents noted that this type of contract has several implications for vendors. Costs are known over the contract life-cycle, thereby giving vendors more control over their performance. Vendors also believed this contract option allows them greater profit potential than a cost-plus contract would allow. Vendors did hold the opinion that federal agencies were trying to limit profits made by contractors. This type of contract allows less flexibility for government purchasers should requirements change. A very similar proportion of agency respondents indicated a preference for fixed-price contracts (see Exhibit IV-12).

Cost-plus contracts were preferred by approximately thirty-percent of the respondent vendors, primarily because this type of contract vehicle can accommodate changes in requirements and specifications.

7. Vendor Perception of the Software Environment

The vendor consensus on types of applications software used by specific agencies was fairly consistent with how the agencies reported software usage, as previously shown in Exhibits IV-2 and IV-3.

Specific agencies that were mentioned by vendors as having the most need for certain applications are listed in Exhibit V-12. Three-quarters of the vendor respondents believed there were typical types of applications that tend to run at specific agencies.

The vendors' views on how agencies will acquire their applications software for midsize systems are presented in Exhibit V-13. Both vendor and agency respondents (see Exhibit IV-8) mentioned only a few types of applications in each category. The opinions of both groups of respondents indicate that there will still be opportunities for software-related services—i.e., modification, installation, training, and integration—even though there is increased federal emphasis on purchasing off-the-shelf software. Functions that previously were not automated will tend to be purchased as off-the-shelf software, i.e., office automation. Applications that have traditionally required customization will continue to be developed for each organizations' specific requirements, i.e., management, logistics, and scientific/engineering applications.

EXHIBIT V-12

VENDOR PERCEPTION OF AGENCY USE
OF APPLICATIONS SOFTWARE

Application Type	Agency Use		
	DOD	Civil	Specific
Information Analysis			USDA Bureau of Land Management
Human Resources	✓	✓	
Word Processing	✓	✓	
Electronic Mail	✓	✓	Large Organizations
Electronic Publishing	✓		Large Organizations U.S. Patent Office
Graphics	✓	✓	Bureau of Land Management
Logistics & Distribution	✓		GSA
Accounting	✓	✓	
Management Systems	✓	✓	
Scientific/Engineering	✓	✓	NASA Bureau of Land Management
Administrative	✓	✓	Large Organizations
Project Management	✓	✓	Large Organizations

Note: 73% indicated specific applications run at specific agencies.

EXHIBIT V-13

VENDOR PERCEPTION OF APPLICATIONS ACQUISITION METHODS

Purchased Off-the-Shelf	Developed/ Customized In-house	Developed/ Customized Outside
Accounting	Information Analysis	Payroll
Project Management	Logistics	Administrative
Word Processing	Scientific/Engineering	
Electronic Mail	DBMS	
Spreadsheets		

The vendor community providing products and services in the federal midrange market is becoming more responsive to the interface require-ments of users. The government is now dictating that hardware and software systems must be OSI compliant. The Government OSI Profile (GOSIP) has just been made a standard. FIPS for POSIX has also been adopted as an interim standard. The OSI standard is replacing the exist-ing TCP/IP communications protocol standard. Various standards, protocols, and networks must be supported by vendors to continue to compete in this market. Exhibit V-14 lists the variety of interconnection methods that industry currently must comply with in the midrange mar-ket. The response is clear: vendors' systems architectures are beginning to accommodate the interconnectivity of applications among multiple hardware systems.

Vendor respondents were asked to rate the "overall necessity" of UNIX-based applications to federal midsize environments in the next few years on a 1-5 scale, where 5 indicated extreme necessity and 1 reflected no necessity at all. The average opinion was 3.6, versus the agencies' rating of 3.0. The higher vendor average rating is most likely due to vendors' seeing more midsize systems opportunities at DoD agencies.

The types of applications that vendors believed will be UNIX-driven are listed in Exhibit V-15.

In comparison, the average "necessity rating" by agency respondents was not as high: 3.0 (see Exhibit IV-5). This variance could reflect the tendency for agencies to think in terms of having vendors respond to requirement needs, not in specifying desired software solutions.

EXHIBIT V-14

STANDARDS, PROTOCOLS, NETWORKS, AND ARCHITECTURES SUPPORTED BY VENDORS IN MIDSIZE MARKET

	Standard	Protocol	Network/Architecture
ETHERNET			✓
TCP/IP		✓	
OSI	✓		
SQL	✓		
SVID	✓		
X.25	✓		
DDN			✓
DECNET			✓
RS-232	✓		
RS-448	✓		
SNA			✓
CALS	✓		
GOSIP	✓		
POSIX	✓		
ADA	✓		
FIPS	✓		
UNIX	✓		
CCEP	✓		
NFS	✓		
COBOL	✓		

Note: 69% mentioned some type(s) of open system interconnection. 19% indicated there were no standards, or no unique standards to be complied with.

EXHIBIT V-15

VENDOR PERCEPTION OF
UNIX-BASED APPLICATIONS
FY1988 - FY1993

Application Types	
S P E C I F I C	Word Processing
	Electronic Mail
	Graphics
	Scientific/Engineering
	Accounting
	Window Management
	Interactive DBMS
G E N E R A L	Heavy Communications Base
	Ada-Based
	Defense

Note: UNIX average necessity rating: 3.6

Industry respondents' views on the market distribution of federal midrange systems are shown in Exhibit V-16. Vendors supported the notion that midrange systems are used in decentralized distributed environments. Vendors categorized over three-fifths of the market as interfacing to mainframe systems, smaller personal computer systems, or communicating in configurations of both types. The standalone portion was viewed to be as high as thirty-five percent.

EXHIBIT V-16

VENDOR VIEWS OF FEDERAL MIDSIZE HARDWARE ENVIRONMENTS

Environment	Market (Percent)
Standalone	35.0
Interfaced to Mainframes	23.0
Interfaced to Smaller Systems	34.0
Interfaced to Larger and Smaller Systems	8.0

C

Vendor Selection Criteria

The respondents to INPUT's vendor questionnaire were asked to identify the controlling factors in vendor selection for midrange systems, as shown in Exhibit V-17. The same question was also asked of agency respondents (see Exhibit IV-15). Vendors' responses were for the most part similar to those of the agencies: the proposed technical solution was ranked first; and life cycle cost was ranked second. Agencies and vendors disagreed on what factor should be ranked third. Agencies indicated initial cost, and vendors specified risk containment procedures.

EXHIBIT V-17

VENDOR RANKING OF CONTRACT SELECTION CRITERIA

Selection Criteria	Rank
Technical Solution	1
Life Cycle Cost	2
Risk Containment	3
Initial Cost	4
Contract Type	5

Participating vendors were asked to state their perceptions of agency preferences for types of contractors they preferred for their procurements. Exhibit V-18 shows the relative ranking of vendor responses. Responses differ slightly from the analogous agency ranking (see Exhibit IV-13). Industry vendors believed that agencies preferred to work with systems integrators over hardware vendors . Agencies selected software vendors as their third choice, whereas vendors thought agencies would place software vendors as one of their last choices.

EXHIBIT V-18

VENDOR PERCEPTION OF AGENCY PREFERENCES FOR MIDSIZE SYSTEM CONTRACTORS

Type of Contractor	Vendor Rank*
System Integrator	1
Hardware Vendor	2
Professional Service Firm	3
Aerospace Divisions	4
Software Manufacturers	5
Not-for-Profit	6
Foreign Manufacturers	7

* Rank based on the average score for each contractor type.

D

Teaming Patterns

As shown in Exhibit V-19, vendors had more suggestions on how to improve their teaming relationships with other vendors, than agencies had for vendors. Some of the additional suggestions were to develop mutual trust, and increase knowledge of each other's business practices. Another recommendation was that vendors interested in competing in this market should be familiar with federal government regulations and requirements.

EXHIBIT V-19

VENDOR SUGGESTIONS FOR
IMPROVED TEAMING RELATIONSHIPS

- Mutual Standards/Responsibilities

- Knowledge of Other Vendors' Business Practices

- Knowledge of Federal Government

- Mutual Trust

- More Experience in Teaming

- Agreements Up Front

Note: Overall teaming success rating: 3.47, based
      on a 1-5 scale

Vendors also viewed their teaming relationships with other vendors as more successful than their client agencies thought. Vendors rated their overall teaming success a 3.47, versus the agency rating of 3.0. A 1-5 scale was used by both vendors and agencies to evaluate past teaming relationships: 5 meant extremely successful; 1 meant not successful at all.

E

Vendor Performance

Both agency and vendor respondents were asked to evaluate vendor performance characteristics that influenced agencies' bid award decisions. Exhibit V-20 lists the vendors' ratings of these characteristics.

Some major differences in opinion exist between vendor and agency respondents, as shown in Exhibit V-21. The characteristic that was ranked most important by agencies was systems software experience, whereas vendors ranked it fourth. Another major discrepancy was found on what characteristic was ranked third. Agencies selected hardware experience, but vendors selected applications offered. The wide variation in the responses of vendors from agencies suggests that vendors need to strengthen their areas of services in line with agencies' perceptions of successful vendors.

EXHIBIT V-20

VENDOR RATING OF SUCCESSFUL
VENDOR CHARACTERISTICS

Vendor Characteristics

Vendor Characteristics	Vendor Rating*
Applications Experience	3.9
Applications Offered	3.6
Integration Experience	3.4
Staff Experience	3.3
Hardware Experience	3.1
Hardware Offered	3.6
Vendor Support Experience	3.7
Systems Software Experience	3.6
Systems Software Offered	3.6
Agency Experience	3.7
Vendor Location	2.4
Delivery Schedule	3.6
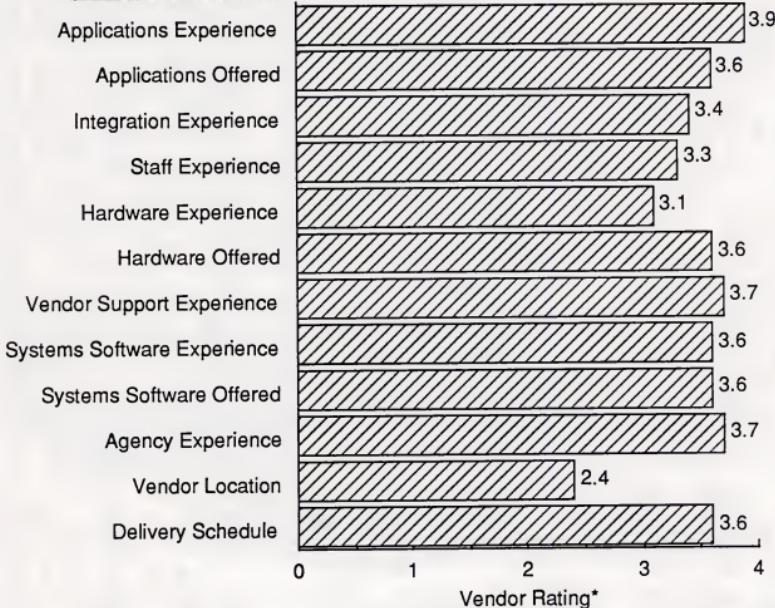
Vendor Rating*

*Rating: 1=Not Crucial, 5=Crucial

EXHIBIT V-21

COMPARISON RANKING* OF SUCCESSFUL VENDOR CHARACTERISTICS

Characteristic	Vendor Ranking	Agency Ranking
Applications Experience	1	5
Applications Offered	3	9
Integration Experience	5	8
Staff Experience	6	4
Hardware Experience	7	3
Hardware Offered	4	5
Vendor Support Experience	2	2
Systems Software Experience	4	1
Systems Software Offered	4	7
Agency Experience	2	6
Vendor Location	(8)	(10)
Delivery Schedule	4	4

☐ Most Successful   ◯ Least Successful

* Rankings based on average ratings.

F

Trends, 1988-1993

1. Increases/Decreases in the Federal Midsize Systems Market

The vast majority of the vendors surveyed projected that their federal midsize systems revenues will be increasing over the next five years, as illustrated in Exhibit V-22. None of the players forecasted a revenue decrease, and only twelve percent believed revenues will remain at their present levels.

Vendors anticipate increases in their market shares as a result of four main factors. Exhibit V-23 shows that many (one-third) are new in this market, and currently have only small percentages of the market. New vendors expect their revenues to increase as they participate in more, and possibly larger, procurements. Another one-third predicted that this market is growing, and so will revenues. Technology improvements and

a rise in systems integration business were also expected to affect revenue increases.

VENDOR REVENUE CHANGES IN THE FEDERAL MIDSIZE MARKET FY1988 - FY1993

Same
12%
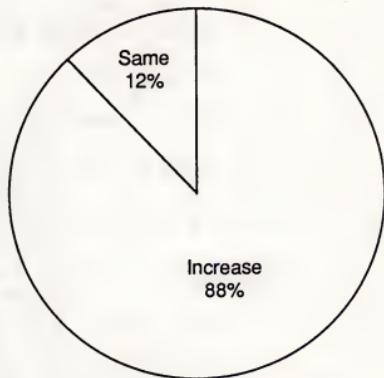
Increase
88%

REASONS FOR VENDOR REVENUE INCREASE FY1988 - FY1993

SI Increase
13.3%

New in Market
33.3%

Improved Technology
20%
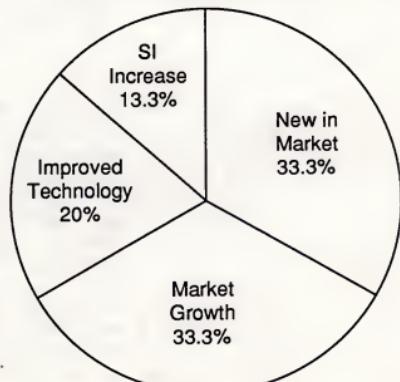
Market Growth
33.3%

When asked specifically why their companies decided to compete in this market, most vendors cited market growth as their top-ranked reason, as seen in Exhibit V-24. Past systems integration successes, new technological advances, and long-term involvement were rated the next most important reasons to participate in this segment of the federal information technology marketplace.

EXHIBIT V-24

FACTORS INFLUENCING DECISION TO COMPETE IN THE FEDERAL MIDRANGE MARKET

Reasons

Reason	Percent of Responses
Growth Potential	94
Past SI Success	63
New Technology	63
Profit	56
Software Skills	44
Have Diversified Skills	50
Long-Term Involvement	63
Defense Prospects	31

Percent of Responses
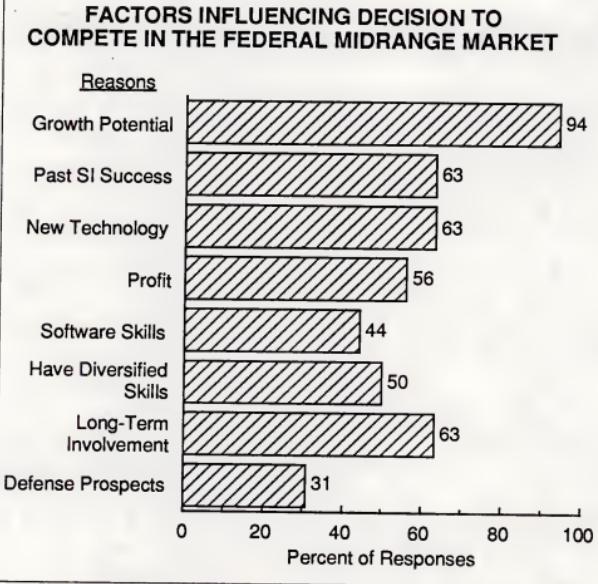
The future of the federal sector of this marketplace is viewed more positively than is the future of the industry in general. At the time of this report's writing, major midrange vendors were reporting revenue difficulties. No one cause was seen as primary, but a combination of factors has hurt anticipated revenues. It is assumed that competitive pressures such as price cutting, the DoD freeze on procurements, the proliferation of products causing purchaser confusion, and a generally sluggish economy have all contributed to low anticipated revenue.

The competitive arena is also expected to see additional vendors posing new threats to the well-known vendors in this market. Fifty percent of INPUT's sample believed increased competition will come from many start-up companies, and almost forty percent see foreign companies

having an impact on market share, as shown in Exhibit V-25. Vendors believe increased competition will make the market more price sensitive, causing cuts in profit potential .

EXHIBIT V-25

VENDORS/ORGANIZATIONS INCREASING COMPETITION IN THE FEDERAL MIDSIZE MARKET

Competitors

Not-for-Profit	6
Foreign Companies	38
New Start-Ups	50

0   10   20   30   40   50   60
Percent Concerned about
Increased Competition
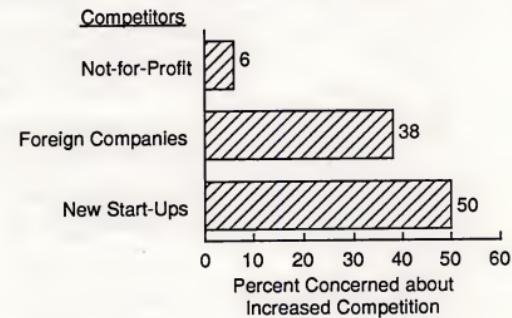
2. Factors Affecting Government Spending

Industry respondents also saw government policies, regulations, and standards bringing special implications into the procurement process for midsize systems. Exhibit V-26 shows that the major disadvantage caused by the FIRMR, Trail Boss Program, and the CICA is that the acquisition process is restricted and complicated. Vendors generally commented that they do not foresee this situation improving for either midsize or mainframe acquisitions in the federal sector. Agencies generally did not see these programs impacting the market as much as vendors did (see Exhibit IV-9).

Many of the technology changes that vendors predict will impact this market reflect federal government requirements for open systems interconnection methods—i.e., increased networking and also parallel processing as shown in Exhibit V-27. Connectivity, interoperability, and upgradability are the watchwords for government IT procurements. New technology innovations will be producing even smaller, cheaper, and faster machines that possess greater functionality.

EXHIBIT V-26

VENDOR PERCEPTIONS OF FEDERAL POLICIES AND REGULATIONS ON MIDSIZE PROCUREMENTS

Policy/ Regulation	Percent Indicated Impact	Comments
FIRMR	23.5	• Complicates Acquisitions
Trail Boss Program	35.3	• Complicates Acquisitions • Shortens Acquisitions Cycle • Increases Large-System Acquisitions
CICA	47.1	• Increases Competition • Lowers Price/Profit • Increases Small-System Opportunities • Complicates Acquisitions • Reduces Sole-Source Procurements
Standards	5.9	• Emphasis on Open Systems

EXHIBIT V-27

VENDOR VIEWS OF TECHNOLOGY CHANGES AFFECTING THE FEDERAL MIDSIZE MARKET

• Smaller, Cheaper, Faster Technology—i.e., RISC

• Increased Networking Due to Standards

• Increased Parallel Processing and Commodity Interfaces

• Sophisticated Workstations

• Sophisticated Networks

• Optical/Image-Processing Systems Evolution

Note: 75% of respondents believed technology changes were affecting systems' requirements.

As shown in Exhibit V-28, the main effect of federal budget constraints on midsize procurements has been to make midsize systems the more affordable option for information technology needs, according to industry respondents. More large, decentralized midsize systems are being procured in place of mainframe systems. There are also more agency, or departmentwide acquisitions for midrange systems. These larger procurements limit the competition in this market. Some programs are also being cancelled, or have had their funding frozen, resulting in a slower acquisition process.

EXHIBIT V-28

VENDOR PERCEPTION OF FEDERAL BUDGET CONSTRAINTS ON THE MIDSIZE MARKET

Percent of Respondents	Effects on Market
25.0	Midsize Systems Increase as Affordable Option
16.7	Fewer and Longer Acquisitions
16.7	Unsure of Funding Programs Cancelled
16.7	Increases Agencywide Standard Procurements
8.3	Increase of IT Budget
16.7	None

Note: 65% of all vendor respondents indicated federal budget
          constraints were affecting the market.

INPUT's analysis shows that the aggregate vendor and agency views on budget impact are very different from each other. Sixty-five percent of the vendors believed that budget constraints were impacting acquisitions. However, 42% of the agency respondents did not see budget restrictions affecting their acquisitions (see Exhibit IV-21).

3. Industry Trends Affecting Vendor Revenue

The industry trends that vendors view as positively impacting the federal midrange market can be categorized into three areas: adherence to open systems architectures (GOSIP); the increased availability of high-performance, low-cost hardware; and distributed processing. OSI-based products allow for the evolution of distributed processing environments. As shown in Exhibit V-29, the presence of stronger personal computers based on the 386 chip will negatively impact midsize procurements due to lower costs and increased performance capabilities.

EXHIBIT V-29

INDUSTRY TRENDS AFFECTING
THE FEDERAL MIDSIZE MARKET

Trend

Open Systems Standards	46
Stronger PCs, i.e., RISC	18
High-Performance, Low-Cost Hardware	27
Distributed Processing	9

Percent of Responses

0 10 20 30 40 50
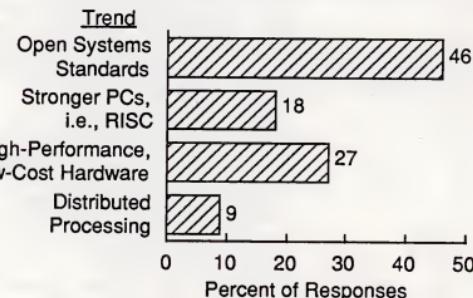
Note: 71% of all respondents stated trends were affecting the market.

As hardware becomes less costly, and conversely more powerful across all three general hardware lines (mainframes, minicomputers, and micro-computers), the distinctions of these categories blur. Industry definitions of systems will need to be totally reevaluated by 1993. Already confusion exists among industry leaders and users as to clear definitions of systems in each category.

VI

Key Opportunities

This section describes specific opportunities in the federal midsize information systems market.

Although the opportunity list is not all-inclusive, it does consist of major programs that are typical of the federal market.

The list of opportunities becomes smaller after FY90 because new programs have not yet been identified or initially approved by the responsible agency. Subsequent issues of this report and the INPUT Procurement Analysis Reports will include additional programs and detailed program information for FY1988 to FY1993.

A
Present and Future Programs

New information technology programs that are larger than $1-2 million are usually listed in at least one of the following federal government documents:

- OMB/GSA Five-Year Plan, which is developed from agency budget requests submitted in compliance with OMB Circular A-11.

- Agency long-range information resource plans developed to meet the reporting requirements of the Paperwork Reduction Act of 1980.

- Agency annual operating budget requests submitted to congressional oversight and appropriations committees based on the OMB A-11 information.

- Commerce Business Daily for specific opportunities, for qualification as a bidder, and to obtain a copy of an RFP or RFQ.

- Five-Year Defense Plan, which is not publicly available, and the supporting documentation of the separate military departments and agencies.

- Classified program documentation available to qualified DoD contractors.

Midsize systems opportunities may not be identified specifically as such in these documents. Information technology planning documents usually identify mission requirements to be met by specific programs rather than methods for meeting these requirements.

All funding proposals are based on cost data of the year submitted, with inflation factors dictated by the Administration as part of its fiscal policy, and are subject to revision, reduction, or spread to future years in response to congressional direction. Some additional reductions will be likely in FY1988 and beyond due to the deficit reduction constraints of the Gramm-Rudman-Hollings Act.

B
Midsize Systems Opportunities by Agency

Agency/Program	PAR Reference	RFP Schedule	Funding FY 88-93 ($ M)
Air Force			
Project 6000	V-1-2	UNK	UNK
Advance Range Data System (ARDS)	V-1-11	UNK	4.0
Air Force WWMCCS Information System (AFWIS)	V-1-27	1QFY90	180.2
Joint WIS (JWIS)	V-1-32	1QFY90	317.0
Command Readiness Exercise Program (CRES)	V-1-34	2QFY89	23.5
Air Force Technical Order Management System (AFTOMS)	V-1-53	3QFY90	23.5
Joint Mission Processor (JMP)	V-1-103	1QFY90	170.0
Contracting Data Management System - Phase II (CDMS)	V-1-104	1QFY90	52.2

Agency/Program		PAR Reference	RFP Schedule	Funding FY 88-93 ($ M)
	Special Operations Forces Enhancement of the Automated Mission Planning System (AMPS)	V-1-105	UNK	UNK
	Computer-Aided Acquisition and Logistic Support (CALS)	V-108	See Indiv. CALS Pgm.	40.9
	Air Force Equipment Management System (AFEMS)	V-1-109	1/89	7.4
Army				
	Army World Wide Military Command and Control System (WWMCS) Information System (AWIS)	V-2-8	1QFY90	223.7
	Reserve Component Automation System (RCAS)	V-2-34	12/88 (Draft)	265.5
	Integrated Procurement System (IPS)	V-2-36	1QFY89	40.6
Navy				
	Military Personnel - Navy (MPN) Financial System (MFS)	V-3-29	FY90	UNK
	Printing Resources Management Information System II (PRMISII)	V-3-34	UNK	13.9
	Strategic Mobility Subsystem	V-3-68	UNK	UNK
	Computer-Aided Acquisition and Logistic Support (CALS)	V-3-80	See Indiv. CALS Pgm.	206.0
	Navy World-Wide Military Command and Control System (WWMCCS) Information System (NWIS)	V-3-83	1QFY90	83.7
	NAVDAC Super Minicomputer Acquisition	V-3-91	11/88	316.4

Agency/Program		PAR Reference	RFP Schedule	Funding FY 88-93 ($ M)
Marines				
	Marine Air Ground Task Force (MAGTF) Automated Services Center	V-3A-4	FY89	34.7
Defense Logistics Agency (DLA)				
	Defense Automatic Addressing Systems (DAAS) ADPE Replacement Program (DARP)	V-4A-4	See Indiv. Programs	8.1
	Logistics System Modernization Program (LSMP)	V-4A-9	1QFY89 (RFI)	204.2
	Computer-Aided Acquisition and Logistic Support (CALS)	V-4A-14	See Indiv. Programs	25.3
DoD Dependent Schools (DoDDS)				
	DoDDS Management Information Systems	V-4F-1	2QFY89	8.9
Agriculture				
	Laboratory/Office Automation	VI-5-22	UNK	16.0
	Forest Level Information Processing System (FLIPS)	VI-5-30	2QFY91	100-150
	Geographic Information System	VI-5-32	UNK	100-150
Commerce				
	Advanced Weather Interactive Processing System (AWIPS)	VI-6-24	2QFY89	101.9
Energy				
	Power Control System	VI-7-57	FY90 (Est.)	UNK
HHS/SSA				
	Computer-Based Training	VII-8-25	UNK	10.9

Agency/Program	PAR Reference	RFP Schedule	Funding FY 88-93 ($ M)
HHS/Office of the Secretary			
Integrated Management of Personnel Administration through Computer Technology (IMPACT)	VII-8-36	FY89	UNK
HHS/HCFA			
Medicare Catastrophic Protection Network	VII-8-38	4QFY89	100.0
Interior/Bureau of Land Management			
ADP Equipment Modernization Project	VII-9-8	6/89	29.7
Automated Land and Mineral Record System (ALMRS)	VII-9-11	6/89	133.0
Interior/U.S. Geological Survey			
U.S. Geological Survey Mark II System	VII-9-19	4QFY88	67.9
Interior/Bureau of Reclamation			
Supervisory Control and Data Acquisition (SCADA)	VII-9-20	1QFY90	UNK
Interior/USGS			
Distributed Information System II (DISII)	VII-9-24	1/89	33.2
Labor/ESA			
Enhanced Federal Employees Compensation System (FECS)	VII-9A-4	1QFY89	49.1
Justice			
Antitrust Office Automation	VII-10-17	UNK	9.0

Agency/Program	PAR Reference	RFP Schedule	Funding FY 88-93 ($ M)
National Crime Information Center Upgrade (NCIC)	VII-10-24	UNK	25.0
Transportation/USCG			
Marine Safety Information System II (MSISII)	VII-11-32	1QFY91	UNK
Treasury/IRS			
Tax System Redesign (TSR)	VII-12-6	3QFY89	1016.9
Treasury Multi-User Acquisition Contract (TMAC)	VII-12-12	1QFY89	UNK
General Services Administration			
Information Processing and Data Communications for the 1990s (IPDC-90)	VIII-14-5	UNK	66.6
NASA			
Class VII Computer System	VIII-15-57	12/88	20.0
Veterans Administration			
DVB Modernization	VIII-16-11	FY91	87.5

A

Interview Profiles

A

Appendix: Interview Profiles

A

Federal Agency Respondent Profile

1. Contact Summary

Contacts with agencies were made both by telephone and through on-site visits. On-site interviews were conducted primarily at the department level with officials in the office of Information Resources Management who are responsible for office systems policy and planning.

The distribution of job classifications among individual agency respondents for the analysis was as follows:

	Policy	Buyers	Users	Total
Respondents	6	5	2	13

2. List of Agencies Interviewed

Respondents interviewed represented the agencies listed below, with the number in parentheses indicating the number of different contacts within the agency.

- Department of Defense
  - Air Force (2)
    - Military Airlift Command
    - Logistics Center
  - Army (2)
    - Defense Logistics Agency

- Civilian Agencies
  - Department of Agriculture (1)
    - Food Safety and Inspectors Service

- Department of Commerce (2)
  - National Oceanic and Atmospheric Administration
  - Patent and Trademark Office

- Department of Energy (2)
  - ADP and Communications Service
  - Office of ADP Management

- Federal Emergency Management Agency (1)
  - Business Applications Division

- Department of Health and Human Services (2)
  - Systems Engineering Division
  - Health Care Finance Administration

- Department of Labor (1)
  - Employment Standards Administration

B
Vendor Respondent Profile

For the 1988 study, INPUT contacted a representative sample of vendors that provide midsize systems to the federal government.

Job classifications among individual vendor respondents included marketing, technical, and administrative executives.

Contacts with vendor personnel were made by telephone and by mail.

B

Definitions

B

Appendix: Definitions

The definitions in this appendix include hardware, software, services, and telecommunications categories to accommodate the range of information systems and services programs described in this report.

Alternate service mode terminology employed by the federal government in its procurement process is defined along with INPUT's regular terms of reference, as shown in Exhibit B-1.

The federal government's unique nontechnical terminology that is associated with applications, documentation, budgets, authorization, and the procurement/acquisition process is included in Appendix C, Glossary of Federal Acronyms.

A

Delivery Modes

Processing services - This category includes transaction processing, utility processing, other processing services, and processing facilities management.

- *Transaction Processing Services* - Updates client-owned data files by entry of specific business activity, such as sales order, inventory receipt, cash disbursement, etc. Transactions may be entered in one of three modes.

  - *Interactive* - Characterized by the interaction of the user with the system, primarily for problem-solving timesharing, but also for data entry and transaction processing; the user is on-line to the program files. Computer response is usually measured in seconds or fractions of a second.

  - *Remote Batch* - Where the user hands over control of a job to the vendor's computer, which schedules job execution according to priorities and resource requirements. Computer response is measured in minutes or hours.

FEDERAL INFORMATION SYSTEMS AND SERVICES PROGRAM
INFORMATION SERVICES INDUSTRY STRUCTURE
1988

Information Services Industry

Processing Services

Network Services

Network Services
- VANs
- EDI
- Electronic Mail
- Other

Electronic Info. Services
- Data Bases
- News
- Videotex
- Other

Processing Services
- Transaction Services
- Utility Services
- Other Services

Systems Operations (Vendor-Owned Equip.)

Turnkey Systems

Equipment
- Workstation/PC
- Midsize Computer
- Mainframe

Packaged Software

Customized Software

Support

Software Products

Applications Software
- Workstation/PC
- Midsize Computer
- Mainframe

Systems Software

Systems Control
- Workstation/PC
- Midsize Computer
- Mainframe

Data Center Management
- Workstation/PC
- Midsize Computer
- Mainframe

Applications Dev. Tools
- Workstation/PC
- Midsize Computer
- Mainframe

Systems Integration

Equipment

Packaged Software

Custom Software

Professional Svcs. (SI Related)

Professional Services

Consulting

Education & Training

Software Development

Systems Operations (Client-Owned Equip.)

Industry-Specific Sectors (15)

Cross-Industry Sectors (7)

- *User Site Hardware Services (USHS)* - Those offerings provided by processing services vendors that place programmable hardware at the user's site rather than at the vendor's data center. Some vendors in the federal government market provide this service under the label of distributed data services. USHS offers:

  * Access to a communications network.

  * Access through the network to the RCS vendor's larger computers.

  * Local management and storage of a data base subset that will service local terminal   users via the connection of a data base processor to the network.

  * Significant software as part of the service.

- *Utility Processing* - Vendor provides access to basic software tools enabling the users to develop their own problem solutions such as language compilers assemblers, DBMS, sorts scientific library routines, and other systems software.

"Other" Processing Services include:

- *Batch Services* - These include data processing at vendors' sites for user programs and/or data that are physically transported (as opposed to transported electronically by telecommunications media) to and/or from those sites. Data entry and data output services, such as keypunching and computer output microfilm processing, are also included. Batch services include expenditures by users who take their data to a vendor site that has a terminal connected to a remote computer for the actual processing. Other services also includes disaster recovery and backup services.

- *Systems Operations (Processing)* - Also referred to as "Resource Management," Facilities Management or "COCO" (contractor-owned, contractor-operated). Systems control is the management of all or part of a user's data processing functions under a long-term contract of not less than one year. This would include remote computing and batch services. To qualify, the contractor must directly plan, control, operate, and own the facility provided to the user–either onsite, through communications lines, or in a mixed mode.

Processing services are further differentiated as follows:

- *Cross-industry* services involve the processing of applications that are targeted to specific user departments (e.g., finance, personnel, sales) but that cut across industry lines. Most general-ledger, accounts receivable, payroll, and personnel applications fall into this category.

Cross-industry data base services, for which the vendor supplies the data base and controls access to it (although it may be owned by a third party), are included in this category. General-purpose tools such as financial planning systems, linear regression packages, and other statistical routines are also included. However, when the application, tool, or data base is designed for specific industry use, then the service is industry-specific (see below).

- *Industry-specific* services provide processing for particular functions or problems unique to an industry or industry group. Specialty applications can be either business or scientific in orientation. Industry-specific data base services, for which the vendor supplies the data base and controls access to it (although it may be owned by a third party), are also included under this category. Examples of industry-specialty applications are seismic data processing, numerically controlled machine tool software development, and demand deposit accounting.

Network Services include a wide variety of network-based function and operations. The common thread is that more of these functions could be performed without network involvement. Network services is divided into several segments: value-added networks (enhanced services), and network applications (electronic information systems).

• *Value-Added Networks (VANs)* - VANs typically involve common carrier network transmission facilities that are augmented with computerized switched. These networks have become associated with packet-switching technology because the public VANs that have received the most attention (e.g., Telenet and TYMNET)employ packet-switching techniques. However, other added data service features such as store-and-forward message switching, terminal interfacing, error detection and correction, and host computer interfacing are of equal importance.

• Network applications include Electronic Data Interchange (EDI) the application-to-application electronic communications between organizations, based on established business document standards, and electronic mail.

Software products - This category includes user purchases of applications and systems software packages for in-house computer systems. Included are lease and purchase expenditures, as well as expenditures for work performed by the vendor to implement or maintain the package at the user's sites. Expenditures for work performed by organizations other than the package vendor are counted in the category of professional services. Fees for work related to education, consulting, and/or custom modification of software products are counted as professional services, provided such fees are charged separately from the price of the software product itself. There are several subcategories of software products, as indicated below and shown in detail in Exhibit B-2.

EXHIBIT B-2

SOFTWARE PRODUCTS

Systems Software

Systems Control

- Access Control
- Communications Monitors
- Encription Systems
- Operating Systems
- Point-to-Point Control
- System Library Control
- Other

Data Center Management

- Capacity Management
- Computer Operations Scheduling
- Data Center Management
- Downtime/Repair Monitoring Management
- Job Accounting
- Performance Monitors
- Tape Management
- Utilities
- Other

Data Base Management Systems

- Data Base Management Systems
- Data Dictionaries
- Other

Applications Development

Program Development and Production Tools

- Application Generators
- Assemblers
- Automatic Documentation
- Compilers
- Debugging Aids
- Languages
- Project Control and Management Systems
- Retrieval Systems
- Spreadsheet Systems
- Translators
- Others

EXHIBIT B-2 (Cont.)

SOFTWARE PRODUCTS (Cont.)

Applications Software

Cross Industry

Accounting
- Accounts Payable
- Accounts Receivable
- Fixed Assets
- General Ledger
- Purchasing
- Other

Human Resources
- Benefits
- Payroll
- Personnel
- Training and Education
- Other

Information Analysis
- Budgeting
- Decision Support Systems
- Financial Planning
- Forecasting
- Modeling
- Other

Logistics Distribution
- Distribution Accounting
- Inventory
- Invoicing/Billing
- Mailing List
- Order Entry
- Procurement
- Other

Word Processing
- Document Generators
- Text Editors
- Word Processing
- Others

Graphics
- Character Graphics
- Line Graphics
- Picture Graphics
- Others

Other
- Administrative Services
- Executive Services
- Operations Services
- Project Control and Planning
- Scientific Engineering and Technical Support
- Other

Industry-Specific
- Education
- Federal Government
- Insurance
- Medical
- Process Manufacturing
- Services
- State and Local Government
- Transportation
- Utilities
- Other

- *Applications Products* - Software that performs functions directly related to solving user's business or organizational need. The products can be:

  - *Cross-Industry Products* - Used in multiple-industry applications as well as the federal government sector. Examples are payroll, inventory control, and financial planning.

  - *Industry-Specific Products* - Used in a specific industry sector, such as banking and finance, transportation, or discrete manufacturing. Examples are demand deposit accounting, airline scheduling, and material resource planning.

- *Systems Software Products* - Software that enables the computer/ communications system to perform basic functions. These products include:

  - *System Control Products* - Function during applications program execution to manage the computer system resources. Examples include operating systems, communication monitors, emulators, spoolers, network control, library control, windowing, access control.

  - *Data Center Management Products* - Used by operations personnel to manage the computer systems resources and personnel more effectively. Examples include performance measurement, job accounting, computer operations scheduling, utilities, capacity management.

  - *Applications Development Products* - Used to prepare applications for execution by assisting in designing, programming, testing, and related functions. Examples include traditional programming languages 4GLs, sorts, productivity aids, assemblers, compilers, data dictionaries, data base management systems, report writers, project control and CASE systems.

Professional Services - This category includes consulting, education and training, software development, and systems operations as defined below.

- *Software development* - Develops a software system on a custom basis. It includes one or more of the following: user requirements definition, system design, contract, programming, documentation.

- *Education and Training* - Products and/or services related to information systems and services for the user, including computer-aided instruction (CAI), computer-based education (CBE), and vendor instruction of user personnel in operations, programming, and maintenance.

- *Consulting Services* - Information systems and/or services management consulting, project assistance (technical and/or management), feasibility analyses, and cost-effectiveness trade-off studies.

- *Systems Operations (Professional Services)* - This is a counterpart to systems operations (professional services) except the computing equipment is owned or leased by the client, not by the vendor. The vendor provides the staff to operate, maintain, and manage the client's facility.

Turnkey Systems - A turnkey system is an integration of systems and applications software with CPU hardware and peripherals, packaged as a single application (or set of applications) solution. The value added by the vendor is primarily in the software and support. Most CAD/CAM systems and many small-business systems are turnkey systems. This does not include specialized hardware systems such as word processors, cash registers, or process control systems, nor does it include Embedded Computer Resources for military applications. Turnkey systems may be either custom or packaged systems.

- Hardware vendors that combine software with their own general-purpose hardware are not classified by INPUT as turnkey vendors. Their software revenues are included the appropriate software category.

- Turnkey systems revenue is divided into two categories.

  - *Industry-specific systems* - that is, systems that serve a specific function for a given industry sector such as automobile dealer parts inventory, CAD/CAM systems, or discrete manufacturing control systems.

  - *Cross-industry systems* - that is, systems that provide a specific function that is applicable to a wide range of industry sectors such as financial planning systems, payroll systems, or personnel management systems.

- Revenue includes hardware, software, and support functions.

Systems Integration: (SI) delivery of large, complex multi-disciplinary, multi-vendor systems, incorporating some or all of these categories: systems design, programming, integration, equipment, packaged software, communication networks, installation education and training, and SI related professional services and acceptance. Systems integration contracts typically take more than a year to complete and involve a prime contractor assuming risk and accepting full responsibiltiy.

B

Hardware/Hardware Systems

Hardware - Includes all computer and telecommunications equipment that can be separately acquired with or without installation by the vendor and not acquired as part of an integrated system.

- *Peripherals* - Includes all input, output, communications, and storage devices (other than main memory) that can be connected locally to the main processor, and generally cannot be included in other categories such as terminals.

- *Input Devices* - Includes keyboards, numeric pads, card readers, light pens and track balls, tape readers, position and motion sensors, and analog-to-digital converters.

- *Output Devices* - Includes printers, CRTs, projection television screens, micrographics processors, digital graphics, and plotters.

- *Communication Devices* - Includes modems, encryption equipment, special interfaces, and error control.

- *Storage Devices* - Includes magnetic tape (reel, cartridge, and cassette), floppy and hard disks, solid state (integrated circuits), and bubble and optical memories.

Terminals - Three types of terminals are described below:

- *User-Programmable* - Also called intelligent terminals, including:

  - Single-station or standalone.
  - Multistation shared processor.
  - Teleprinter.
  - Remote batch.

- *User Nonprogrammable*

  - Single-station.
  - Multistation shared processor.
  - Teleprinter.

- *Limited Function* - Originally developed for specific needs, such as point-of-sale (POS), inventory data collection, controlled access, and other applications.

Hardware Systems - Includes all processors from microcomputers to supercomputers. Hardware systems may require type- or model-unique operating software to be functional, but this category excludes applica-

tions software and peripheral devices, other than main memory and processors or CPUs not provided as part of an integrated (turnkey) system.

- *Microcomputer* - Combines all of the CPU, memory, and peripheral functions of an 8-, 16-, or 32-bit computer on a chip in the form of:

  - Integrated circuit package.

  - Plug-in boards with more memory and peripheral circuits.

  - Console including keyboard and interfacing connectors.

  - Personal computer with at least one external storage device directly addressable by the CPU.

  - An embedded computer which may take a number of shapes or configurations.

- *Midsize Computer* - Typically a 32- or 64-bit computer with extensive applications software and a number of peripherals in standalone or multiple-CPU configurations for business (administrative, personnel, and logistics) applications; also called a general purpose computer. All Intel 80386, Motorola 68000-based systems, and large multi-user systems are included. Specific systems in this category are: IBM 93XX systems, all Digital VAX series systems, and such common UNIX-based systems as from Apollo and Sun) are also included. Most large shared-logic, integrated office systems—such as those from Wang, Hewlett-Packard, and Honeywell Bull—would also be considered midsize systems. Does not include microcomputers (standalone, or shared), embedded systems and CAD/CAM systems.

- *Large Computer* - Presently centered around storage controllers but likely to become bus-oriented and to consist of multiple processors or parallel processors. Intended for structured mathematical and signal processing and typically used with general purpose, VonNeumann-type processors for system control. Usually refers to traditional mainframes (such as IBM 30XX, UNISYS (Sperry) 1100/XX, Honeywell DDPS88, UNISYS (Burroughs) A15, or CDC Cyber series) and supercomputers (such as products from Cray, ETA, Fujitsu, and the new IBM development effort).

- *Supercomputer* - High-powered processors with numerical processing throughput that is significantly greater than the fastest general purpose computers, with capacities in the 100-500 million floating point operations per second (MFLOPS) range. Newer supercomputers, with burst modes over 500 MFLOPS, main storage size up to 10 million words, and on-line storage in the one-to-three gigabyte class, are labeled Class

IV to Class VII in agency long-range plans. Supercomputers fit in one of two categories:

- *Real Time* - Generally used for signal processing in military applications.

- *Non-Real Time* - For scientific use in one of three configurations:

  * Parallel processors.
  * Pipeline processor.
  * Vector processor.

- *Super( )computer* - Term applied to micro, mini, and large mainframe computers with performance substantially higher than attainable by VonNeuman architectures.

- *Embedded Computer* - Dedicated computer system designed and implemented as an integral part of a weapon, weapon system, or platform; critical to a military or intelligence mission such as command and control, cryptological activities, or intelligence activities. Characterized by military specifications (MIL SPEC) appearance and operation, limited but reprogrammable applications software, and permanent or semi-permanent interfaces. May vary in capacity from microcomputers to parallel processors computer systems.

C
Telecommunications

Networks - Electronic interconnection between sites or locations that may incorporate links between central computer sites and remote locations and switching and/or regional data processing nodes. Network services typically are provided on a leased basis by a vendor to move data, voice, video, or textual information between locations. Networks can be categorized in several different ways.

- *Common Carrier Network* - A public access network, such as provided by AT&T, consisting of conventional voice-grade circuits and regular switching facilities accessed through dial-up calling with leased or user-owned modems for transfer rates between 150 and 1200 baud.

- *Value-Added Network (VAN)* - (See listing under Section B, Delivery Modes.)

- *Local Area Network (LAN)* - Limited-access network between computing resources in a relatively small (but not necessarily contiguous) area, such as a building, complex of buildings, or buildings distributed within a metropolitan area. Uses one of two signaling methods.

  - B*aseband* - Signaling using digital waveforms on a single frequency band, usually at voice frequencies and bandwidth, and limited to a

single sender at any given moment. When used for local-area networks, typically implemented with TDM to permit multiple access.

- *Broadband* - Transmission facilities that use frequencies greater than normal voice-grade, supported in local-area networks with RF modems and AC signaling. Also known as wideband. Employs multiplexing techniques that increase carrier frequency between terminals to provide:

  ° Multiple (simultaneous) channels via FDM (Frequency Division Multiplexing).

  ° Multiple (time-sequenced) channels via TDM (Time Division Multiplexing).

  ° High-speed data transfer rate via parallel mode at rates of up to 96,000 baud (or higher, depending on media).

• *Wide Area Network (WAN)* - Limited access network between computing resources in buildings, complexes of buildings, or buildings within a large metropolitan or wide geographical area. Uses baseband or broadband signaling methods.

Transmission Facilities - Includes wire, carrier, coaxial cable, microwave, optical fiber, satellites, cellular radio, and marine cable operating in one of two modes depending on the vendor and the distribution of the network.

• *Mode* - may be either:

  - *Analog* - Transmission or signal with continuous-waveform representation, typified by AT&T's predominantly voice-grade DDD network and most telephone operating company distribution systems.

  - *Digital* - Transmission or signal using discontinuous, discrete quantities to represent data, which may be voice, data, record, video, or text, in binary form.

• *Media* - May be any of the following:

  - *Wire* - Varies from earlier single-line teletype networks, to two-wire standard telephone (twisted pair), to four-wire full-duplex balanced lines.

  - *Carrier* - A wave, pulse train, or other signal suitable for modulation by an information-bearing signal to be transmitted over a communications system, used in multiplexing applications to increase network capacity.

- *Coaxial Cable* - A cable used in HF (high-frequency) and VHF (very high frequency), single-frequency, or carrier-based systems; requires frequent reamplification (repeaters) to carry the signal any distance.

- *Microwave* - UHF (ultra-high-frequency) multichannel, point-to-point, repeated radio transmission, also capable of wide frequency channels.

- *Optical Fiber* - Local signal distribution systems employed in limited areas, using light-transmitting glass fibers and TDM for multichannel applications.

- *Communications Satellites* - Synchronous earth-orbiting systems that provide point-to-point, two-way service over significant distances without intermediate amplification (repeaters), but requiring suitable groundstation facilities for up- and down-link operation.

- *Cellular Radio* - Network of fixed, low-powered two-way radios that are linked by a computer system to track mobile phone/data set units. Each radio serves a small area called a cell. The computer switches service connections to the mobile unit from cell to cell.

D

General Definitions

103/113 - Bell standard modem for low-speed transmission up to 300 bps, asynchronous, half or full duplex.

212 - Bell standard for medium-speed transmission at 1200 bps, asynchronous or synchronous, half or full duplex.

ASCII - American National Standard Code for Information Interchange—eight-bit code with seven data bits and one parity bit.

Asynchronous - Communications operation (such as transmission) without continuous timing signals. Synchronization is accomplished by appending signal elements to the data.

Bandwidth - Range of transmission frequencies that can be carried on a communications path; used as a measure of capacity.

Baud - Number of signal events (discrete conditions) per second. Typically used to measure modem or terminal transmission speed.

Benchmark - Method of testing proposed ADP system solutions for a specified set of functions (applications) employing simulated or real data inputs under simulated operating conditions.

BPS - Bits per second - also mbps and kbps, million bits per second and thousand bits per second, respectively.

BSC - IBM's binary synchronous communications data link protocol. First introduced in 1968 for use on point-to-point and multipoint communications channels. Frequently referenced as "bisync."

Byte - Usually equivalent to the storage required for one alphanumeric character (i.e., one letter or number).

CBX - Computerized Branch Exchange - a PABX based on a computer system, implying programmability and usually voice and data capabilities.

Central Processing Unit (CPU) - The arithmetic and control portion of a computer; i.e., the circuits controlling the interpretation and execution of computer instructions.

Centrex - Central office telephone services that permit local circuit switching without installation of customer premises equipment. Could be described as shared PBX service.

Circuit Switching - A process that, usually on demand, connects two or more network stations and permits exclusive circuit use until the connection is released; typical of the voice telephone network where a circuit is established between the caller and the called party.

CO - Central Office - local telco site for one or more exchanges.

CODEC - Coder/decoder, equivalent to modem for digital devices.

Constant Dollars - Growth forecasts in constant dollars make no allowance for inflation or recession. Dollar value based on the year of the forecast unless otherwise indicated.

Computer System - The combination of computing resources required to perform the designed functions and which may include one or more CPUs, machine room peripherals, storage systems, and/or applications software.

CPE - Customer Premises Equipment - DCE or DTE located at a customer site rather than at a carrier site such as the local telephone company CO. May include switchboards, PBX, data terminals, and telephone answering devices.

CSMA/CD - Carrier Sense Multiple Access/Collision Detect. Contention protocol used in local-area networks, typically with a multi-point configuration.

Current Dollars - Estimates or values expressed in current-year dollars which, for forecasts, would include an allowance for inflation.

Data Encryption Standard (DES) - 56-bit key, one-way encryption algorithm adopted by NBS in 1977, implemented through hardware ("S-boxes") or software. Designed by IBM with NSA guidance.

Datagram - A self-contained packet of information with a finite length that does not depend on the contents of preceding or following packets.

DCA - IBM's Document Content Architecture - protocols for specifying document (text) format which are consistent across a variety of hardware and software systems within IBM's DISOSS.

DCE - Data Circuit-terminating Equipment - interface hardware that couples DTE to a transmission circuit or channel by providing functions to establish, maintain, and terminate a connection, including signal conversion and coding.

DDCMP - Digital Data Communications Message Protocol - data link protocol used in Digital Equipment Company's DECNET.

DECNET - Digital Equipment Company's network architecture.

Dedicated Circuit - A permanently established network connection between two or more stations; contrast with switched circuit.

DEMS - Digital Electronic Message Service - nationwide common carrier digital networks which provide high-speed, end-to-end, two-way transmission of digitally-encoded information using the 10.6 GHz band.

DIA - IBM's Document Interchange Architecture - protocols for transfer of documents (text) between different hardware and software systems within IBM's DISOSS.

DISOSS - IBM's DIStributed Office Support System - office automation environment, based on DCA and DIA, which permits document (text) transfer between different hardware and software systems without requiring subsequent format or content revision.

Distributed Data Processing - The development of programmable intelligence in order to perform a data processing function where it can be accomplished most effectively through computers and terminals arranged in a telecommunications network adapted to the user's characteristics.

DTE - Data Terminal Equipment - hardware which is a data source or link or both, such as video display terminals that convert user information into data for transmission and reconvert data signals into user information.

EBCDIC - Extended Binary Coded Decimal Interchange Code - eight-bit code typically used in IBM mainframe environments.

EFT - Electronic funds transfer.

Encryption - Electrical, code-based conversion of transmitted data to provide security and/or privacy of data between authorized access points.

End User - One who is using a product or service to accomplish his or her own functions. The end user may buy a system from the hardware supplier(s) and do his or her own programming, interfacing, and installation. Alternately, the end user may buy a turnkey system from a systems house or hardware integrator, or may buy a service from an in-house department or external vendor.

Engineering Change Notice (ECN) - Product changes to improve the product after it has been released to production.

Engineering Change Order (ECO) - The follow-up to ECNs - they include parts and a bill of materials to effect the change in the hardware.

Equipment Operators - Individuals operating computer control consoles and/or peripheral equipment (BLS definition).

Ethernet - Local area network developed by Xerox PARC using baseband signaling, CSMA/CD protocol, and coaxial cable to achieve a 10 mbps data rate.

Facsimile - Transmission and reception of data in graphic form, usually fixed images of documents, through scanning and conversion of a picture signal.

FDM - Frequency Division Multiplexing - a multiplexing method that permits multiple access by assigning different frequencies of the available bandwidth to different channels.

FEP - Front-End Processor - communications concentrator such as the IBM 3725 or COMTEN 3690 used to interface communications lines to host computers.

Field Engineer (FE) - Field engineer, customer engineer, serviceperson, and maintenance person are used interchangeably and refer to the individual who responds to a user's service call to repair a device or system.

Full-Duplex - Bi-directional communications with simultaneous two-way transmission.

General Purpose Computer System - A computer designed to handle a wide variety of problems. Includes machine room peripherals, systems software, and small business systems.

Half-Duplex - Bi-directional communications, but only in one direction at a time.

Hardware Integrator - Develops system interface electronics and controllers for the CPU, sensors, peripherals, and all other ancillary hardware components. The hardware integrator also may develop control system software in addition to installing the entire system at the end-user site.

HDLC - High-level Data Link Control.

Hertz - Number of signal oscillations (cycles) per second - abbreviated Hz.

IBM Token Ring - IBM's local area network using baseband signalling and operating at 4 mbps on twisted-pair copper wire. Actually a combination of star and ring topologies – IEEE 802.5-compatible.

IDN - Integrated Digital Network - digital switching and transmission; part of the evolution to ISDN.

Independent Suppliers - Suppliers of machine room peripherals - usually do not supply general purpose computer systems.

Information Processing - Data processing as a whole, including use of business and scientific computers.

Installed Base - Cumulative number or value (cost when new) of computers in use.

Interconnection - Physical linkage between devices on a network.

Interoperability - The capability to operate with other devices on a network. To be contrasted with interconnection, which merely guarantees a physical network interface.

ISDN - Integrated Services Digital Network - integrated voice and non-voice public network service which is completely digital. Not clearly defined through any existing standards although FCC and other federal agencies are participating in the development of CCITT recommendations.

Keypunch Operators - Individuals operating keypunch machines (similar in operation to electric typewriters) to transcribe data from source materials onto punch cards.

Lease Line - Permanent connection between two network stations. Also known as dedicated or non-switched line.

Machine Repairers - Individuals who install and periodically service computer systems.

Machine Room Peripherals - Peripheral equipment that is generally located close to the central processing unit.

Mainframe - The central processing unit (CPU or units in a parallel processor) of a computer that interprets and executes computer (software) instructions of 32 bits or more. Usually refers to traditional mainframes (such as IBM 30XX, UNISYS (Sperry) 1100/XX, Honeywell DDPS88, UNISYS (Burroughs) A15, or CDC (Cyber series).

MAP - Manufacturing Automation Protocol - seven-layer communications standard for factory environments promoted by General Motors/EDS. Adopts IEEE 802.2 and IEEE 802.4 standards plus OSI protocols for other layers of the architecture.

Mean Time to Repair - The mean of elapsed times from the arrival of the field engineer on the user's site until the device is repaired and returned to user service.

Mean Time to Respond - The mean of elapsed times from the user call for services and the arrival of the field engineer on the user's site.

Message - A communication intended to be read by a person. The quality of the received document need not be high, only readable. Graphic materials are not included.

MMFS - Manufacturing Messaging Format Standard - application-level protocol included within MAP.

Modem - A device that encodes information into electronically transmittable from (MOdulator) and restores it to original analog form (DEModulator).

NCP - Network Control Program - software used in IBM 3705/3725 FEPs for control of SNA networks.

Node - Connection point of three or more independent transmission points which may provide switching or data collection.

Off-Line - Pertaining to equipment or devices that can function without direct control of the central processing unit.

On-Line - Pertaining to equipment or devices under direct control of the central processing unit.

OSI - ISO reference model for Open Systems Interconnection - seven-layer architecture for application, presentation, session, transport, network, data link, and physical services and equipment.

OSI Application Layer - Layer 7, providing end-user applications services for data processing.

OSI Data Link Layer - Layer 2, providing transmission protocols, including frame management, link flow control, and link initiation/release.

OSI Network Layer - Layer 3, providing call establishment and clearing control through the network nodes.

OSI Physical Layer - Layer 1, providing the mechanical, electrical, functional, and procedural characteristics to establish, maintain, and release physical connections to the network.

OSI Presentation Layer - Layer 6, providing data formats and information such as data translation, data encoding/decoding, and command translation.

OSI Session Layer - Layer 5, establishes, maintains, and terminates logical connections for the transfer of data between processes.

OSI Transport Layer - Layer 4, providing end-to-end terminal control signals such as acknowledgements.

Overseas - Not within the geographical limits of the continental United States, Alaska, Hawaii, and U.S. possessions.

PABX - Private Automated Branch Exchange - hardware that provides automatic (electro-mechanical or electronic) local circuit switching on a customer's premises.

PAD - Packet Assembler-Disassembler - a device that enables DTE not equipped for packet switching operation to operate on a packet switched network.

PBX - Private Branch Exchange - hardware which provides local circuit switching on the customer premise.

PCM - Pulse-Code Modulation - modulation involving conversion of a waveform from analog to digital form through coding.

PDN - Public Data Network - a network established and operated by a recognized private operating agency, a telecommunications administration, or other agency for the specific purpose of providing data transmission services to the public.

Peripherals - Any unit of input/output equipment in a computer system, exclusive of the central processing unit.

PPM - Pulse Position Modulation.

Private Network - A network established and operated for one user or user organization.

Programmers - Persons mainly involved in designing, writing, and testing of computer software programs.

Protocols - The rules for communication system operation that must be followed if communication is to be effected. Protocols may govern portions of a network or service. In digital networks, protocols are digitally encoded as instructions to computerized equipment.

Public Network - A network established and operated for more than one user with shared access, usually available on a subscription basis. See related international definition of PDN.

Scientific Computer System - A computer system designed to process structured mathematics, such as Fast Fourier Transforms, and complex, highly redundant information, such as seismic data, sonar data, and radar, with large on-line memories and very high capacity throughput.

SDLC - Synchronous Data Link Control - IBM's data link control for SNA. Supports a subset of HDLC modes.

SDN - Software-Defined Network.

Security - Physical, electrical, and computer (digital) coding procedures to protect the contents of computer files and data transmission from inadvertent or unauthorized disclosure to meet the requirements of the Privacy Act and national classified information regulations.

Service Delivery Point - The location of the physical interface between a network and customer/user equipment.

Simplex - Undirectional communications.

Smart Box - A device for adapting existing DTE to new network standards such as OSI. Includes PADs and protocol convertors, for example.

SNA - Systems Network Architecture-seven-layer communications architecture designed by IBM. Layers correspond roughly but not exactly to OSI model.

Software - Computer programs.

Supplies - Includes materials associated with the use or operations of computer systems, such as printer paper, keypunch cards, disk packs, and tapes.

Switched Circuit - Temporary connection between two network stations established through dial-up procedures.

Synchronous - Communications operation with separate, continuous clocking at both sending and receiving stations.

Systems Analyst - Individual who analyzes problems to be converted to a programmable form for application to computer systems.

Systems House - Vendor that acquires, assembles, and integrates hardware and software into a total system to satisfy the data processing requirements of an end user. The vendor also may develop systems software products for license to end users. The systems house vendor does not manufacture mainframes.

Systems Integrator - Systems house vendor that develops systems interface electronics, applications software, and controllers for the CPU, peripherals, and ancillary subsystems that may have been provided by a contractor or the government (GFE). This vendor may either supervise or perform the installation and testing of the completed system.

TI - Bell System designation for 1.544 mbps carrier capable of handling 24 PCM voice channels.

TDM - Time Division Multiplexing - a multiplexing method that interleaves multiple transmissions on a single circuit by assigning a different time slot to each channel.

Token Passing - Local area network protocol which allows a station to transmit only when it has the "token," an empty slot on the carrier.

TOP - Technical Office Protocol - protocol developed by Boeing Computer Services to support administrative and office operations as complementary functions to factory automation implemented under MAP.

Turnkey System - System composed of hardware and software integrated into a total system designed to completely fulfill the processing requirements of a single application.

Twisted-Pair Cable - Communications cabling consisting of pairs of single-strand metallic electrical conductors, such as copper wires, typically used in building telephone wiring and some LANs.

Verification and Validation - Process for examining and testing applications and special systems software to verify that it operates on the target CPU and performs all of the functions specified by the user.

Voice-Grade - Circuit or signal in the 300-3300 Hz bandwidth typical of the public telephone system - nominally a 4 KHz user.

VTAM - Virtual Telecommunications Access Method - host-resident communications software for SNA networks.

E

Other Considerations   When questions arise as to the proper place to count certain user expenditures, INPUT addresses the questions from the user viewpoint. Expenditures then are categorized according to what the users perceive they are buying.

C

Glossary of Federal Acronyms

C

Appendix: Glossary of Federal Acronyms

The federal government's procurement language uses a combination of acronyms, phrases, and words that is complicated by different agency definitions and interpretations. The government also uses terms of accounting, business, economics, engineering, and law with new applications and technology.

Acronyms and contract terms that INPUT encountered most often in program documentation and interviews for this report are included here, but this glossary should not be considered all-inclusive. Federal procurement regulations (DAR, FPR, FAR, FIRMR, FPMR) and contract terms listed in RFIs, RFPs, and RFQs provide applicable terms and definitions.

Federal agency acronyms have been included to the extent they are employed in this report.

A

Acronyms

AAS	Automatic Addressing System.
AATMS	Advanced Air Traffic Management System.
ACO	Administrative Contracting Offices (DCAS).
ACS	Advanced Communications Satellite (formerly NASA 30/20 GHz Satellite Program).
ACT-1	Advanced Computer Techniques (Air Force).
Ada	DoD High-Order Language.
ADA	Airborne Data Acquisition.
ADL	Authorized Data List.
ADS	Automatic Digital Switches (DCS).
AFA	Air Force Association.
AFCEA	Armed Forces Communications Electronics Association.
AGE	Aerospace Ground Equipment.
AIP	Array Information Processing.

AIS	Automated Information System
AMPE	Automated Message Processing Equipment.
AMPS	Automated Message Processing System.
AMSL	Acquisition Management Systems List.
ANG	Army National Guard
AP(P)	Advance Procurement Plan.
Appropriation	Congressionally approved funding for authorized programs and activities of the Executive Branch.
APR	Agency Procurement Request.
ARPANET	DARPA network of scientific computers.
ASP	Aggregated Switch Procurement
ATLAS	Abbreviated Test Language for All Systems (for ATE-Automated Test Equipment).
Authorization	In the legislative process programs, staffing, and other routine activities must be approved by Oversight Committees before the Appropriations Committee will approve the money from the budget.
AUSA	Association of the U.S. Army.
AUTODIN	AUTOmatic DIgital Network of the Defense Communications System.
AUTOSEVOCOM	Automatic Secure Voice Communications Network
AUTOVON	AUTOmatic VOice Network of the Defense Communications System.
BA	Basic Agreement.
BAFO	Best And Final Offer.
Base level	Procurement, purchasing, and contracting at the military installation level.
BCA	Board of Contract Appeals.
Benchmark	Method of evaluating ability of a candidate computer system to meet user requirements.
Bid protest	Objection (in writing, before or after contract award) to some aspect of a solicitation by a valid bidder.
BML	Bidders Mailing List - qualified vendor information filed annually with federal agencies to automatically receive RFPs and RFQs in areas of claimed competence.
BOA	Basic Ordering Agreement.
B&P	Bid and Proposal - vendor activities in response to government solicitation/specific overhead allowance.
BPA	Blanked Purchase Agreement.
Budget	Federal Budget, proposed by the President and subject to Congressional review.
C^2	Command and Control.
C^3	Command, Control, and Communications.
C^4	Command, Control, Communications, and Computers.
C^3I	Command, Control, Communications, and Intelligence.
CAB	Contract Adjustment Board or Contract Appeals Board.
CADE	Computer-Aided Design and Engineering.
CADS	Computer-Assisted Display Systems.
CAIS	Computer-Assisted Instruction System.
CALS	Computer-Aided Automated Logistic System
CAPS	Command Automation Procurement Systems.

CAS	Contract Administration Services or Cost Accounting Standards.
CASB	Cost Accounting Standards Board.
CASP	Computer-Assisted Search Planning.
CBD	Commerce Business Daily - U.S. Department of Commerce publication listing government contract opportunities and awards.
CBO	Congressional Budget Office.
CCEP	Commercial Comsec Endorsement Program
CCDR	Contractor Cost Data Reporting.
CCN	Contract Change Notice.
CCPDS	Command Center Processing and Display Systems.
CCPO	Central Civilian Personnel Office.
CCTC	Command and Control Technical Center (JCS).
CDR	Critical Design Review.
CDRL	Contractor Data Requirement List.
CFE	Contractor-Furnished Equipment.
CFR	Code of Federal Regulations.
CICA	Competition in Contracting Act
CIG	Computerized Interactive Graphics.
CIR	Cost Information Reports.
CM	Configuration Management.
CMI	Computer-Managed Instruction.
CNI	Communications, Navigation, and Identification.
CO	Contracting Office, Contract Offices, or Change Order.
COC	Certificate of Competency (administered by the Small Business Administration).
COCO	Contractor-Owned, Contractor-Operated.
CODSIA	Council of Defense and Space Industry Associations.
COMSTAT	Communications Satellite Corporation.
CONUS	CONtinental United States.
COP	Capability Objective Package.
COTR	Contracting Officer's Technical Representative.
CP	Communications Processor.
CPAF	Cost-Plus-Award-Fee Contract.
CPFF	Cost-Plus-Fixed-Fee Contract.
CPIF	Cost-Plus-Incentive-Fee Contract.
CPR	Cost Performance Reports.
CPSR	Contractor Procurement System Review.
CR	Cost Reimbursement (Cost Plus Contract).
CSA	Combat or Computer Systems Architecture.
C/SCSC	Cost/Schedule Control System Criteria (also called "C-Spec").
CWAS	Contractor Weighted Average Share in Cost Risk.
DAL	Data Accession List.
DAR	Defense Acquisition Regulations.
DARPA	Defense Advanced Research Projects Agency.
DAS	Data Acquisition System.
DBHS	Data Base Handling System.
DCA	Defense Communications Agency.

DCAA	Defense Contract Audit Agency.
DCAS	Defense Contract Administration Services.
DCASR	DCAS Region.
DCC	Digital Control Computer.
DCP	Development Concept Paper (DoD).
DCS	Defense Communications System.
DCTN	Defense Commercial Telecommunications Network.
DDA	Dynamic Demand Assessment (Delta Modulation).
DDC	Defense Documentation Center.
DDL	Digital Data Link - A segment of a communications network used for data transmission in digital form.
DDN	Defense Data Network.
DDS	Dynamic Diagnostics System.
DECCO	DEfense Commercial Communications Office
DECEO	DEfense Communications Engineering Office
D&F	Determination and Findings - required documentation for approval of a negotiated procurement.
DIA	Defense Intelligence Agency.
DIF	Document Interchange Format, Navy-sponsored word processing standard.
DHHS	Department of Health and Human Services
DIDS	Defense Integrated Data Systems.
DISC	Defense Industrial Supply Center.
DLA	Defense Logistics Agency.
DMA	Defense Mapping Agency.
DNA	Defense Nuclear Agency.
DO	Delivery Order.
DOA	Department of Agriculture (also USDA).
DOC	Department of Commerce.
DOE	Department of Energy.
DOI	Department of Interior.
DOJ	Department of Justice.
DOS	Department of State.
DOT	Department of Transportation.
DPA	Delegation of Procurement Authority (granted by GSA under FPRs).
DPC	Defense Procurement Circular.
DQ	Definite Quantity Contract.
DQ/PL	Definite Quantity Price List Contract.
DR	Deficiency Report
DSCS	Defense Satellite Communication System
DSN	Defense Switched Network
DSP	Defense Support Program (WWMCCS).
DSS	Defense Supply Service.
DTC	Design-To-Cost.
ECP	Engineering Change Proposal.
ED	Department of Education.
EEO	Equal Employment Opportunity.
8(a) Set-Aside	Agency awards direct to Small Business Administration for direct placement with a socially/economically disadvantaged company.

EMC	Electro-Magnetic Compatibility.
EMCS	Energy Monitoring and Control System.
EO	Executive Order - Order issued by the President.
EOQ	Economic Ordering Quantity.
EPA	Economic Price Adjustment.
EPA	Environmental Protection Agency.
EPMR	Estimated Peak Monthly Requirement.
EPS	Emergency Procurement Service (GSA) or Emergency Power System.
EUC	End User Computing, especially in DoD.
FA	Formal Advertising.
FAC	Facility Contract.
FAR	Federal Acquisition Regulations.
FCA	Functional Configuration Audit.
FCC	Federal Communications Commission.
FCDC	Federal Contract Data Center.
FCRC	Federal Contract Research Center.
FDPC	Federal Data Processing Center.
FEDSIM	Federal (Computer) Simulation Center (GSA).
FEMA	Federal Emergency Management Agency.
FFP	Firm Fixed-Price Contract (also Lump Sum Contract).
FIPS	NBS Federal Information Processing Standard.
FIPS PUBS	FIPS Publications.
FIRMR	Federal Information Resource Management Regulations.
FMS	Foreign Military Sales.
FOC	Final Operating Capability.
FOIA	Freedom of Information Act.
FP	Fixed-Price Contract.
FP-L/H	Fixed-Price - Labor/Hour Contract.
FP-LOE	Fixed-Price - Level-Of-Effort Contract.
FPMR	Federal Property Management Regulations.
FPR	Federal Procurement Regulations.
FSC	Federal Supply Classification.
FSG	Federal Supply Group.
FSN	Federal Supply Number.
FSS	Federal Supply Schedule or Federal Supply Service (GSA).
FSTS	Federal Secure Telecommunications System.
FT Fund	A revolving fund, designated as the Federal Telecommunications Fund, used by GSA to pay for GSA-provided common-user services, specifically including the current FTS and proposed FTS 2000 services.
FTPS	Federal Telecommunications Standards Program administered by NCS; Standards are published by GSA.
FTS	Federal Telecommunications System.
FTS 2000	Proposed replacement for the Federal Telecommunications System.
FY	Fiscal Year.
FYDP	Five-Year Defense Plan.
GAO	General Accounting Office.
GFE	Government-Furnished Equipment.

GFM	Government-Furnished Material.
GFY	Government Fiscal Year (October to September).
GIDEP	Government-Industry Data Exchange Program.
GOCO	Government Owned - Contractor Operated.
GOGO	Government Owned - Government Operated.
GOSIP	Government Open Systems Interconnect Profile.
GPO	Government Printing Office.
GPS	Global Positioning System.
GRH	Gramm-Rudman-Hollings Act (1985), also called Gramm-Rudman Deficit Control
GS	General Schedule.
GSA	General Services Administration.
GSBCA	General Services Administration Board of Contract Appeals.
HCFA	Health Care Financing Administration.
HHS	(Department of) Health and Human Services.
HPA	Head of Procuring Activity.
HSDP	High-Speed Data Processors.
HUD	(Department of) Housing and Urban Development.
ICA	Independent Cost Analysis.
ICAM	Integrated Computer-Aided Manufacturing.
ICE	Independent Cost Estimate.
ICP	Inventory Control Point.
ICST	Institute for Computer Sciences and Technology, National Bureau of Standards, Department of Commerce.
IDAMS	Image Display And Manipulation System.
IDEP	Interservice Data Exchange Program.
IDN	Integrated Data Network.
IFB	Invitation For Bids.
IOC	Initial Operating Capability.
IOI	Internal Operating Instructions.
IPS	Integrated Procurement System.
IQ	Indefinite Quantity Contract.
IR&D	Independent Research & Development.
IRM	Information Resource Manager.
IXS	Information Exchange System.
JOCIT	Jovial Compiler Implementation Tool.
JSIPS	Joint Systems Integration Planning Staff.
JSOP	Joint Strategic Objectives Plan.
JSOR	Joint Service Operational Requirement.
JUMPS	Joint Uniform Military Pay System.
LC	Letter Contract.
LCC	Life Cycle Costing.
LCMP	Life Cycle Management Procedures (DD7920.1).

LCMS	Life Cycle Management System.
L-H	Labor-Hour Contract.
LOI	Letter of Interest.
LRPE	Long-Range Procurement Estimate.
LRIRP	Long-Range Information Resource Plan.
MAISRC	Major Automated Information Systems Review Council (DoD).
MANTECH	MANufacturing TECHnology.
MAPS	Multiple Address Processing System.
MAP/TOP	Manufacturing Automation Protocol/Technical and Office Protocol.
MASC	Multiple Award Schedule Contract.
MDA	Multiplexed Data Accumulator.
MENS	Mission Element Need Statement or Mission Essential Need Statement (see DD-5000.1 Major Systems Acquisition).
MILSCAP	Military Standard Contract Administration Procedures.
MIL SPEC	Military Specification.
MIL STD	Military Standard.
MIPR	Military Interdepartmental Purchase Request.
MOD	Modification.
MOL	Maximum Ordering Limit (Federal Supply Service).
MPC	Military Procurement Code.
MYP	Multi-Year Procurement.
NARDIC	Navy Research and Development Information Center.
NASA	National Aeronautics and Space Administration.
NBS	National Bureau of Standards.
NCMA	National Contract Management Association.
NCS	National Communications System; responsible for setting U.S. Government standards administered by GSA; also holds primary responsibility for emergency communications planning.
NICRAD	Navy-Industry Cooperative Research and Development.
NIP	Notice of Intent to Purchase.
NMCS	National Military Command System.
NSA	National Security Agency.
NSEP	National Security and Emergency Preparedness.
NSF	National Science Foundation.
NSIA	National Security Industrial Association.
NTIA	National Telecommunications and Information Administration of the Department of Commerce; replaced the Office of Telecommunications Policy in 1970 as planner and coordinator for government communications programs; primarily responsible for radio.
NTIS	National Technical Information Service.
Obligation	"Earmarking" of specific funding for a contract from committed agency funds.
OCS	Office of Contract Settlement.
OFCC	Office of Federal Contract Compliance.
Off-Site	Services to be provided near but not in government facilities.
OFMP	Office of Federal Management Policy (GSA).

OFPP	Office of Federal Procurement Policy.
OIRM	Office of Information Resources Management.
O&M	Operations & Maintenance.
OMB	Office of Management and Budget.
O,M&R	Operations, Maintenance, and Readiness.
On-Site	Services to be performed on a government installation or in a specified building.
OPM	Office of Procurement Management (GSA) or Office of Personnel Management.
Options	Sole-source additions to the base contract for services or goods to be exercised at the government's discretion.
OSHA	Occupational Safety and Health Act.
OSI	Open System Interconnect
OSP	Offshore Procurement.
OTA	Office of Technology Assessment (Congress).
Out-Year	Proposed funding for fiscal years beyond the Budget Year (next fiscal year).
P-I	FY Defense Production Budget.
P3I	Pre-Planned Product Improvement (program in DoD).
PAR	Procurement Authorization Request or Procurement Action Report.
PAS	Pre-Award Survey.
PASS	Procurement Automated Source System.
PCO	Procurement Contracting Officer.
PDA	Principal Development Agency.
PDM	Program Decision Memorandum.
PDR	Preliminary Design Review.
PIR	Procurement Information Reporting.
PME	Performance Monitoring Equipment.
PMP	Purchase Management Plan.
PO	Purchase Order or Program Office.
POM	Program Objective Memorandum.
POSIX	Portable Open System Interconnect Exchange.
POTS	Purchase of Telephone Systems.
PPBS	Planning, Programming, Budgeting System.
PR	Purchase Request or Procurement Requisition.
PRA	Paperwork Reduction Act.
PS	Performance Specification - alternative to a Statement of Work, when work to be performed can be clearly specified.
QA	Quality Assurance.
QAO	Quality Assurance Office.
QMCS	Quality Monitoring and Control System (DoD software).
QMR	Qualitative Material Requirement (Army).
QPL	Qualified Products List.
QRC	Quick Reaction Capability.
QRI	Quick Reaction Inquiry.
R-I	FY Defense RDT&E Budget.
RAM	Reliability, Availability, and Maintainability.
RC	Requirements Contract.

R&D	Research and Development.
RDA	Research, Development, and Acquisition.
RDD	Required Delivery Date.
RD&E	Research, Development, and Engineering.
RDF	Rapid Deployment Force.
RDT&E	Research, Development, Test, and Engineering.
RFI	Request For Information.
RFP	Request For Proposal.
RFQ	Request For Quotation.
RFTP	Request For Technical Proposals (Two-Step).
ROC	Required Operational Capability.
ROI	Return On Investment.
RTAS	Real Time Analysis System.
RTDS	Real Time Display System.
SA	Supplemental Agreement.
SBA	Small Business Administration.
SB Set-Aside	Small Business Set-Aside contract opportunities with bidders limited to certified small businesses.
SCA	Service Contract Act (1964 as amended).
SCN	Specification Change Notice.
SDN	Secure Data Network.
SEC	Securities and Exchange Commission.
SE&I	Systems Engineering and Integration.
SETA	Systems Engineering/Technical Assistance.
SETS	Systems Engineering/Technical Support.
SIBAC	Simplified Intragovernmental Billing and Collection System.
SIMP	Systems Integration Master Plan.
SIOP	Single Integrated Operations Plan.
SNAP	Shipboard Nontactical ADP Program.
Sole Source	Contract award without competition.
Solicitation	Invitation to submit a bid.
SOR	Specific Operational Requirement.
SOW	Statement of Work.
SSA	Source Selection Authority (DoD).
SSAC	Source Selection Advisory Council.
SSEB	Source Selection Evaluation Board.
SSO	Source Selection Official (NASA).
STINFO	Scientific and Technical INFOrmation Program - Air Force/NASA.
STU	Secure Telephone Unit.
SWO	Stop-Work Order.
Synopsis	Brief Description of contract opportunity in CBD after D&F and before release of solicitation.
TA/AS	Technical Assistance/Analysis Services.
TCP/IP	Transmission Control Protocol/Internet Protocol.

TEMPEST	Studies, inspections, and tests of unintentional electromagnetic radiation from computer, communication, command, and control equipment that may cause unauthorized disclosure of information; usually applied to DoD and security agency testing programs.
TILO	Technical and Industrial Liason Office—Qualified Requirement Information Program - Army.
TM	Time and Materials contract.
TOA	Total Obligational Authority (Defense).
TOD	Technical Objective Document.
TR	Temporary Regulation (added to FPR, FAR).
TRACE	Total Risk Assessing Cost Estimate.
TRCO	Technical Representative of the Contracting Offices.
TREAS	Department of Treasury.
TRP	Technical Resources Plan.
TSP	GSA's Teleprocessing Services Program.
TVA	Tennessee Valley Authority.
UCAS	Uniform Cost Accounting System.
USA	U.S. Army.
USAF	U.S. Air Force.
USCG	U.S. Coast Guard.
USMC	U.S. Marine Corps.
USN	U.S. Navy.
U.S.C.	United States Code.
USPS	United States Postal Service.
USRRB	United States Railroad Retirement Board.
VA	Veterans Administration.
VE	Value Engineering.
VHSIC	Very High Speed Integrated Circuits.
VIABLE	Vertical Installation Automation BaseLine (Army).
VICI	Voice Input Code Identifier.
WBS	Work Breakdown Structure.
WGM	Weighted Guidelines Method.
WIN	WWMCCS Intercomputer Network.
WITS	Washington Interagency Telecommunications System.
WIS	WWMCCS Information Systems.
WS	Work Statement - Offerer's description of the work to be done (proposal or contract).
WWMCCS	World-Wide Military Command and Control System.

B

General and Industry

ADAPSO	Association of Data Processing Service Organization, now the Computer Software and Services Industry Association.
ADP	Automatic Data Processing.
ADPE	Automatic Data Processing Equipment.
ANSI	American National Standards Institute.
BOC	BELL Operating Company.
CAD	Computer-Aided Design.
CAM	Computer-Aided Manufacturing.
CBEMA	Computer and Business Equipment Manufacturers Association.
CCIA	Computers and Communications Industry Association.
CCITT	Comite Consultaif Internationale de Telegraphique et Telephonique; Committee of the International Telecommunication Union.
COBOL	COmmon Business-Oriented Language.
COS	Corporation for Open Systems
CPU	Central Processor Unit.
DMBS	Data Base Management System.
DRAM	Dynamic Random Access Memory
EIA	Electronic Industries Association.
EPROM	Erasable Programmable Read-Only-Memory.
IEEE	Institute of Electrical and Electronics Engineers.
ISDN	Integrated Services Digital Networks.
ISO	International Organization for Standardization; voluntary international standards organization and member of CCITT.
ITU	International Telecommunication Union.
LSI	Large-Scale Integration.
MFJ	Modified Final Judgement.
PROM	Programmable Read-Only Memory.
RBOC	Regional Bell Operating Company.
UNIX	AT&T Proprietary Operating System.
UPS	Uninterruptable Power Source.
VAR	Value Added Retailer.
VLSI	Very Large Scale Integration.
WORM	Write-Once-Read-Many-Times.

D

Policies, Regulations, and Standards

D

Appendix: Policies, Regulations, and Standards

A
OMB Circulars

A-11	Preparation and Submission of Budget Estimates.
A-49	Use of Management and Operating Contracts.
A-71	Responsibilities for the Administration and Management of Automatic Data Processing Activities.
A-76	Policies for Acquiring Commercial or Industrial Products and Services Needed by the Government.
A-109	Major Systems Acquisitions.
A-120	Guidelines for the Use of Consulting Services.
A-121	Cost Accounting, Cost Recovery, and Integrated Sharing of DataProcessing Facilities.
A-123	Internal Control Systems.
A-127	Financial Management Systems.
A-130	Management of Federal Information Resources.
A-131	Value Engineering.

B
GSA Publications

The FIRMR as published by GSA is the primary regulation for use by federal agencies in the management, acquisition, and use of both ADP and telecommunications information resources.

C
DoD

DD-5000.1	Major System Acquisitions.
DD-5000.2	Major System Acquisition Process.
DD-5000.11	DoD Data Elements and Data Codes Standardization Program.
DD-5000.31	Interim List of DoD-Approved High-Order Languages.
DD-5000.35	Defense Acquisition Regulatory Systems.
DD-5200.1	DoD Information Security Program.
DD-5200.28	Security Requirements for Automatic Data Processing (ADP) Systems.

	DD-5200.28-M	Manual of Techniques and Procedures for Implementing, Deactivating, Testing and Evaluating Secure Resource Sharing ADP Systems.
	DD-7920.1	Life Cycle Management of Automated Information (AIS).
	DD-7920.2	Major Automated Information Systems Approval Process.
	DD-7935	Automated Data Systems (ADS) Documentation.

D

Standards	ADCCP	Advanced Data Communications Control Procedures; ANSI Standard X3.66 of 1979; also NBS FIPS 71.
	CCITT G.711	International PCM standard.
	CCITT T.0	International standard for classification of facsimile apparatus for document transmission over telephone-type circuits.
	DEA-1	Proposed ISO standard for data encryption based on the NBS DES.
	EIA RS-170	Monochrome video standard.
	EIA RS-170A	Color video standard.
	EIA RS-464	EIA PBX standards.
	EIA RS-465	Standard for Group III facsimile.
	EIA RS-466	Facsimile standard; procedures for document transmission in the General Switched Telephone Network.
	EIA RS-232-C	EIA DCE to DTE interface standard using a 25-Pin connector; similar to CCITT V-24.
	EIA RS-449	New EIA standard DTE to DCE interface which replaces RS-232-C.
	FED-STD 1000	Proposed Federal Standard for adoption of the full OSI reference model.
	FED-STD 1026	Federal Data Encryption Standard (DES) adopted in 1983; also FIPS 46.
	FED-STD 1041	Equivalent to FIPS 100.
	FED-STD 1061	Group II Facsimile Standard (1981).
	FED-STD 1062	Federal standard for Group III facsimile; equivalent to EIA RS-465.
	FED-STD 1063	Federal facsimile standard; equivalent to EIA RS-466.
	FED- STDs 1005, 1005A-1008	Federal Standards for DCE Coding and Modulation.
	FIPS 46	NBS Data Encryption Standard (DES).
	FIPS 81	DES Modes of Operation.
	FIPS 100	NBS Standard for packet-switched networks; subset of 1980 CCITT X.25.
	FIPS 107	NBS Standard for local area networks, similar to IEEE 802.2 and 802.3.

FIPS 146	Government Open Systems Interconnection (OSI) Profile (GOSIP)
FIPS 151	NIST POSIX (Portable Operating System Interface for UNIX) standard.
IEEE 802.2	OSI-Compatible IEEE standard for data-link control in local area networks.
IEEE 802.3	Local area network standard similar to Ethernet.
IEEE 802.4	OSI-compatible standard for token-bus local area networks.
IEEE 802.5	Local area networks standard for token-ring networks.
IEEE P1003.1	POSIX standard, similar to FIPS 151
MIL-STD-188-114C	Physical interface protocol similar to RS-232 and RS-449
MIL-STD-1777	IP-Internet Protocol.
MIL-STD-1778	TCP - Transmission Control Protocol.
MIL-STD-1780	File Transfer Protocol.
MIL-STD-1781	Simple Mail Transfer Protocol (electronic mail).
MIL-STD-1782	TELNET - virtual terminal protocol.
MIL-STD-1815A	Ada Programming Language Standard.
SVID	UNIX System Interface Definition.
X.12	ANSI standard for Electronic Data Interchange
X.21	CCITT Standard for interface between DTE and DCE for synchronous operation on public data networks.
X.25	CCITT standard for interface between DTE and DCE for terminals operating in the packet mode on public data networks.
X.75	CCITT standard for links that interface different packet networks.
X.400	ISO Application-level standard for theElectronic transfer of messages (electronic mail).

E

Related INPUT Reports

Appendix: Related INPUT Reports

A
Annual Market Analyses

U.S. Information Services Vertical Markets, 1987.

U.S. Information Services Cross-Industry Markets, 1987.

Procument Analysis Reports, GFY 1988-1993.

B
Industry Surveys

U.S. Information Services Industry, 1987.

Eighteenth Annual ADAPSO Survey of the Computer Services Industry, 1984.

Directory of Leading U.S. Information Services Vendors, 1988.

C
Market Reports

Federal Large Scale Systems Market, 1988-1993.

Federal Software Markets, 1987-1992.

Federal Systems Integration Market, 1987-1992.

Federal ADP Facilities Management Market, 1987-1992.

Federal Telecommunications Market, 1988-1993.

Federal Government Processing Services Market, 1987-1992.

Federal Office Information Systems Market, 1988-1993.

Federal Professional Services Market, 1988-1993

F

Questionnaires

F

Appendix: Questionnaires

INPUT Questionnaires—Definitions

For the purpose of this survey, we have defined *Midsize System* and other related services *for ADP* as follows:

- *Midsize System*—Includes IBM 93xx systems, all Digital VAX series systems, and such common UNIX-based systems as Altos and Gould. Intelligent workstations (such as those from Apollo and Sun) are also included. Most large, shared-logic, integrated office systems, such as those from Wang, Hewlett-Packard, and Honeywell Bull would also be considered midsize systems. Does not include microcomputers (standalone or shared), embedded systems, and CAD/CAM systems.

- *Large Systems*—Refers to traditional mainframes (such as IBM 30xx, UNISYS (Sperry) 1100/xx, Honeywell DDPS88, UNISYS (Burroughs) A15, or CDC Cyber series) and supercomputers (such as products from Cray, ETA, Fujitsu, and the new IBM development effort). Does not include such common products as Digital VAX systems, which are classified as midsize systems.

- *Supercomputer*—High-powered processors with numerical processing throughout that is significantly greater than the fastest general purpose computers, with capacities in the 10-50 million floating point operations per second (MFLOPS) range. Newer supercomputers, with burst modes approaching 300 MFLOPS, main storage size up to 10 million words, and on-line storage in the one-to-three gigabyte class, are labeled Class IV to Class VII in agency long-range plans.

- *Small Systems*—Refers to personal computers and small utility shared-logic systems with ten or fewer terminals.

- *Operation and Maintenance*—(Also referred to as O&M)—Contractor (vendor) staffed support of client ADP/Telecommunications equipment

on-site (on government property), in cases where the vendor does not
manage the complete facility and the equipment and initial software
suite may not have been provided by the vendor.

- *Maintenance (Hardware and/or Software)*—Vendor furnished services
  provided after installation and acceptance by the user. These services
  may be part of a warranty or may be separately contracted; services
  may be provided by resident or on-call personnel of the vendor.

- *Programming and Analysis*—Including system design, contract or
  custom programming, code conversion, independent verification and
  validation (also called "IV&V"), benchmarking.

- *Systems Integration*—Services associated with systems design, integra-
  tion of computing components, installation and government acceptance
  of ADP/telecommunications systems under projects called SE&I or
  SETA. Integration services may be provided with related engineering
  activities such as SE&I (Systems Engineering and Integration) or
  SETA (Systems Engineering and Technical Assistance).

- *Turnkey Systems*—Turnkey systems, also known as integrated systems,
  include systems and applications software packages with hardware as a
  single entity. Most CAD/CAM systems and many small business
  systems are integrated systems. This mode does not include specialized
  hardware systems such as word processors, cash registers, and process
  control systems.

- *Professional Services*—Professional services include consulting,
  education and training, programming and analysis, facilities manage-
  ment, and systems integration.

- *Software Products*—Systems and applications packages that are sold to
  computer users by equipment manufacturers, independent vendors, and
  others. Also included are fees for work performed by the vendor to
  implement a package at the user's site.

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AGENCY Questionnaire—Federal Midsize Systems Market

This questionnaire is directed to the study of the hardware, software, and services which comprise midsize computer systems in the federal government. The classification of computer hardware in this market includes IBM 93xx systems, all Digital VAX series systems, and such common UNIX-based systems as Altos and Gould. Intelligent workstations (such as those from Apollo and Sun) are also included. Most large shared-logic, integrated office systems, such as those from Wang, Hewlett-Packard, and Honeywell Bull are considered midsize systems. This study excludes microcomputers (standalone or shared), large mainframes, supercomputers, embedded systems, and CAD/CAM systems.

1a. Does your organization currently employ any midsize computer systems for program operations (**check one**)

Yes ❑   No ❑ (**go to Question 6a**)

1b. Approximately how many?

_____ (**enter number**)

_____ Don't Know

2. What equipment comprises your current midsize computer system(s)? (**identify equipment types: DEC, IBM, CDC, etc., and model numbers**)

_____

_____

_____

3a. What is your average annual expenditure for hardware?

_____

3b. What percent of your hardware budget is directed to midsize system hardware?

_____

4a. Do any of your organization's midsize systems interface to: (**check all that apply**)

❑ A large mainframe system(s)?
❑ A smaller system (PC networks, smaller minis)?
(**If neither item was checked in 4a, go to Question 5**)

4b.   How does your midsize system(s) communicate to a larger system?

_____

_____

_____

To a smaller system?

_____

_____

_____

5.   What types of applications are running on your organization's midsize systems? **(check all that apply)**

Application

Information Analysis	❏
Human Resources/Payroll	❏
Word Processing	❏
Electronic Mail	❏
Electronic Publishing	❏
Graphics	❏
Logistics and Distr.	❏
Accounting	❏
Management Systems	❏
Scientific/Engineering	❏
Administrative	❏
Project Management	❏

6a.   Does your organization have plans to add, upgrade, or replace a midsize system(s) through FY1993? **(check one)**

Yes	❏	**(go to Question 6c)**
No	❏	**(go to Question 16)**
Don't Know	❏	**(go to Question 6b)**

6b.   Who is the person within your organization that would know this information?

Name: _____

Title: _____

Phone: _____

6c.   What is the anticipated number of midsize systems that your organization is planning to implement through FY1993?

_____

7.   How does your organization plan to accomplish the change and/or addition of your midsize systems? **(check all that apply)**

   ❑ Buy hardware only
   ❑ Buy integrated system(s)
   ❑ Buy turnkey system(s)
   ❑ Buy hardware separately and use a systems integrator contractor
   ❑ Buy hardware separately and do integration in-house
   ❑ Buy operational support with the hardware

   More the applications to outside sources such as:
   ❑ Other Agency Centers
   ❑ Remote Computer Service (for instance, Teleprocessing Services Program)
   ❑ Contractor-Owned Contractor-Operated Facilities

8a.   Will any of the new midsize system(s) interface to: **(check all that apply)**

   ❑ A larger mainframe system?
   ❑ or a smaller system?

   (If neither item was checked in 8a, go to Question 10)

8b.   How will your new midsize system(s) communicate to a larger system(s)?

_____

_____

_____

   To a smaller system(s)?

_____

_____

_____

9. How will your systems interface requirements dictate the software environment that will be procured for the new midsize system(s)?

    _____

    _____

    _____

    ❑ N/A; Don't know.

10. What type of systems software is your organization planning to procure for the new midsize systems? **(check all that apply)**.

    Systems Control Software   Data Center Management Software

    Access Control   ❑   Capacity Planning   ❑
    Communications Monitors   ❑   Computer Operations   ❑
    Encryption Systems   ❑   Scheduling
    Point-to-Point Control   ❑   Data Center Management   ❑
    Operating System   ❑   Downtime/Repair
    (specify):   Monitoring Management   ❑
                                      Job Accounting   ❑
    Applications Development/   Performance Monitors   ❑
    Programming Tools   Tape Management   ❑
                                      Utilities   ❑
    Application Generators   ❑
    Assemblers   ❑   DBMS Software
    Compilers   ❑
    Automatic Documentation   ❑
    Debugging Aids   ❑   DBMS   ❑
    Languages   ❑   Data Dictionary   ❑
    Project Management
    Systems   ❑
    Retrieval Systems   ❑
    Spreadsheet Systems   ❑
    Translators   ❑

    Other **(specify):** _____
    Other **(specify):** _____

11. How would you rate the overall necessity to your organization of employing UNIX for your midsize computer systems operations through FY1993? Please use 1-5 scale; where 5 means extreme necessity, and 1 means of no necessity at all.

    (circle response)   1   2   3   4   5

12. What types of applications will be run on your organization's new midsize systems? Also, please indicate what functions will be supported by each application.

_____

_____

_____

13. What applications will run under UNIX on your new midsize systems and why?

_____

_____

14. Which of your applications will be:

Purchased as "off the shelf" software?

_____

_____

Developed or customized in-house?

_____

_____

Developed or customized by an outside vendor?

_____

_____

15a. Are you planning to contract for outside services to satisfy your midsize system(s) requirements in any way? (check one)

Yes ❑   No ❑   Don't Know ❑

(If No, or Don't know to 15a, go to Question 16)

15b. How (or why) are you planning to use outside services to accomplish these requirements?

_____

_____

16. In your opinion, who are the most important hardware vendors in the midsize systems market? (specify **vendor names**)

    _____
    _____
    _____
    _____
    _____
    _____
    _____
    _____ Don't Know

17. Below is a short list of possible types of vendors. Please indicate which type of vendor in order of preference (rank order) your organization would prefer for midsize systems contracts. Use a 1,2,3,4 order; where 1 means most preferred. (**read each item and indicate ranking of 1,2,3, etc.**)

    Hardware Vendor   _____
    Systems Integrator   _____
    Professional Service Firms _____
    Software Manufacturers   _____
    Aerospace (Divisions)   _____
    Not-For-Profit Organizations _____
    Foreign Manufacturers   _____
    Other (specify): _____ _____

18. Could you please rate the following vendor characteristics that influence your organization's contract award decisions on a 1-5 scale; where 5 means the characteristic would have a critical influence; and 1 means it would have no influence at all. (**read each item, circle response**)

Characteristics		Rating			
Applications experience	1	2	3	4	5
Applications offered	1	2	3	4	5
Integration experience	1	2	3	4	5
Staff experience	1	2	3	4	5
Hardware experience	1	2	3	4	5
Hardware offered	1	2	3	4	5
Vendor support experience	1	2	3	4	5
Systems software experience	1	2	3	4	5
Systems software offered	1	2	3	4	5
Agency experience	1	2	3	4	5
Vendor location	1	2	3	4	5
Delivery schedule	1	2	3	4	5
Other (specify): _____	1	2	3	4	5

19.   What would be the controlling criteria in selection of a hardware contractor? **(Rank #1,2,3, etc. where 1 means most important criteria)**

_____ Contract Type
_____ Risk Containment Procedures
_____ Initial Cost
_____ Life Cycle Cost
_____ Other **(specify):** _____
_____ Don't Know

20a.   Based on either your current or past procurements, how would you rate the overall success level of your vendors' (hardware, software, professional services vendors, etc.) teaming relationships using again a 1-5 scale; where 5 means extremely successful; and 1 means not successful at all.

(circle response)   1   2   3   4   5
(If no answer to 20a, go to Question 21)

20b.   How might the teaming relationship(s) be improved?

_____

_____

_____

21.   In general, how can vendors better respond to federal government information systems needs?

_____

_____

_____

22.   What specific services could vendors offer to your organization that would make their services more valuable?

_____

_____

_____

23. How do you think each of the following government policies, or programs will impact your organization's midsize systems requirements through FY1993? **(read each item, indicate response).**

FIRMR

_____

_____

Trail Boss

_____

_____

Standards

_____

_____

CICA

_____

_____

Any others?

_____

24a. Are technology changes affecting your midsize system requirements through FY1993? **(check one)**

Yes o   No ❑   Don't know ❑
(If no, or don't know, go to Question 25)

24b. What technology changes, and how are they affecting your organization's needs?

_____

_____

_____

25. What impact, if any, have federal government budget constraints had on your organization's midsize systems requirements through FY1993?

_____

_____

_____

26. Which of the following contract types does your organization prefer for midsize systems procurements? **(check one)**

Cost Plus   o
Fixed Price   ❑
Fixed Fee   ❑
Other (specify): _____

Why? _____

_____

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INDUSTRY Questionnaire—Federal Midsize Systems Market

This questionnaire is directed to the study of the hardware, software, and services which comprise midsize computer systems in the federal government. The classification of computer hardware in this market includes IBM 93xx systems, all Digital VAX series systems, and such common UNIX-based systems as Altos and Gould. Intelligent workstations (such as those from Apollo and Sun) are also included. Most large shared logic, integrated office systems, such as those from Wang, Hewlett-Packard, and Honeywell Bull are considered midsize systems. This study excludes microcomputers (standalone or shared), large mainframes, supercomputers, embedded systems, and CAD/CAM systems.

1a.   Does your company now provide or plan to provide midsize computer systems in the federal marketplace? **(check one)**

   Yes ❑   No ❑ (end)

2.   What types of hardware or services do you provide or plan to provide in the midsize market? **(check all that apply)**

	Current	Future
Midsize Computers	❑	❑
Other Computer Hardware	❑	❑
Hardware Maintenance	❑	❑
Software Maintenance	❑	❑
Consulting	❑	❑
Systems Integration	❑	❑
Facilities Management/ Operational Support	❑	❑
Programming and Analysis	❑	❑
Other (specify): _____	❑	❑

3a.   Which of the following reasons have influenced your company's decision to compete in the federal midsize systems market for products or services? **(check all that apply)**

Growth potential	❑
Past systems integration success	❑
New technology	❑
Profit potential	❑
Software skills	❑
Possess diversity of required skills	❑
Long term involvement	❑
Defense prospect	❑
Other (specify): _____	❑
Don't know	❑

(Proceed to 3b, only if Don't know was checked in Question 3a)

3b.   Who else within your company might be able to answer these types of questions?

        Name: _____
        Title: _____
        Phone: _____

        (New respondent, please begin with Question 3a)

4a.   What was your company's total corporate revenue for FY87?

        (enter revenue) _____

4b.   What percent of your company's FY87 revenue was derived from the federal midsize systems
        market?

        (enter percentage) _____
        Don't Know   _____

4c.   Does your company think its revenues will increase, or decrease in this segment of the federal
        market through FY93 and why? **(check one, and explain why)**

        increasing ❑ because: _____

        _____

        decreasing ❑ because: _____

        _____

        remaining the same ❑ because: _____

        _____

5.   What functions has your company performed as a systems integrator in the development of
        federal agencies midsize computer systems?

        _____

        _____

6.   In your opinion, do you perceive any increased competition in the federal midsize hardware
        and related services market arising from the following type vendors or organizations?

        Colleges/University Centers _____
        Not-For-Profit Organizations _____
        Foreign Companies _____
        (In conjunction with Systems Integrators)
        New Start-Up Vendors _____

Comments regarding effect on industry:

_____

_____

_____

7.   In your opinion, how do you think each of the following government policies, or programs will impact your organization's midsize systems requirements through FY1993? **(read each item, indicate response)**

FIRMR

_____

_____

Trail Boss

_____

_____

CICA

_____

_____

Any others?

_____

_____

How?

_____

_____

8.   Are there any architectures, standards, or software specifications that your company must comply with in providing software and midsize hardware to federal agencies? (i.e., Army 3 Tier Architecture)

_____

_____

9a.   How will your systems' interface requirements dictate the software environment that will be
        procured for federal agencies midsize system(s)?

        _____

        _____

        _____

        ❑ N/A; Don't Know

9b.   What types of interfaces does your company provide?

        _____

        _____

        _____

10a.   Do you foresee any technology changes affecting federal midsize systems requirements
        through FY1993? (check one)

        Yes   ❑
        No   ❑ (go to Question 11)
        Don't Know   ❑ (go to Question 11)

10b.   Which technology changes and why?

        _____

        _____

        _____

11.   What impact, if any, have federal government budget constraints had on federal midsize
        systems requirements through FY1993?

        _____

        _____

        _____

12.   What differences are perceived by your company between the federal and commercial midsize
        systems markets?

        _____

        _____

13. What industry trends will affect the federal market for midsize computer systems?

_____

_____

_____

Why?

_____

_____

14. In your opinion, what specific problems or advantages face vendors in the federal midsize market?

Problems: _____

_____

_____

Advantages: _____

_____

_____

15. What would you like to see vendors do in the next two to five years to make their products and services more valuable to the federal midsize market?

_____

_____

_____

16. Below is a short list of possible types of vendors. Please indicate which type of vendor you believe federal government agencies will prefer to award their midsize systems contracts to in order of preference (rank order). Use a 1,2,3,4 order; where 1 means most preferred. (**read each item and indicate ranking of 1,2,3, etc.**)

Vendor Type	Rank
Hardware Vendor	_____
Systems Integrator	_____
Professional Service Firms	_____
Software Manufacturers	_____

Vendor Type   Rank

Aerospace (Divisions)   _____
Not-For-Profit Organizations _____
Foreign Manufacturers   _____
Other (specify): _____ _____

17.   In your opinion, what percentage of the federal midsize systems market is: (indicate percent
      in each category)

                                        Percent

Standalone   _____
Interfacing to mainframes   _____
Interfacing to smaller systems   _____
Combination (specify):   _____
_____

18.   Which of the following contract types does your company prefer to have with federal govern-
      ment agencies for midsize systems procurements? (check one)

Cost Plus   ❏
Fixed Price   ❏
Fixed Fee   ❏
Other (specify):   ❏
_____

Why: _____

_____

_____

19.   In your opinion, which agencies provide the most attractive opportunities for your company in
      the midsize systems market?

_____

_____

_____

20a. Do you think there are typical types of applications that tend to run on midsize systems at
      specific types of agencies? (check one)

Yes   ❏
No   ❏   (go to Question 22a)
Don't Know   ❏   (go to Question 22a)

20b. Which agencies will have the most need for the following types of applications running on midsize systems in the next few years? **(for each application indicate agencies)**

Application	Specify Agency
Information Analysis	_____
Human Resources/Payroll	_____
Word Processing	_____
Electronic Mail	_____
Electronic Publishing	_____
Graphics	_____
Logistics and Distr.	_____
Accounting	_____
Management Systems	_____
Scientific/Engineering	_____
Administrative	_____
Project Management	_____

21. Which applications will generally be:

Purchased as "off the shelf" software?

_____

_____

Developed or customized in-house?

_____

_____

Developed or customized by an outside vendor?

_____

_____

22a. How would you rate the overall necessity of UNIX-based applications to federal agency midsize computer systems requirements through the next few years? Please use 1-5 scale; where 5 = extreme necessity, and 1 = of no necessity at all.

(circle response)   1   2   3   4   5

22b. Which, if any, types of applications do you believe will only be UNIX based?

_____

_____

23. What typical types of systems software will be procured by agencies for midsize systems? **(enter software type and agency)**

Systems Software   Agency

_____   _____

_____   _____

_____   _____

_____   _____

_____   _____

24a. Based on either your company's experience, how would you rate the overall success level of your teaming relationships with other vendors? Use a 1-5 scale; where 5 means extremely successful; and 1 means not successful at all.

(circle response)   1   2   3   4   5

24b. How might these relationships be improved?

_____

_____

_____

25. How would you rate the following vendor characteristics in winning a federal midsize system bid, again using a 1-5 scale: This time 5 = crucial, and 1 = definitely not crucial. **(circle one rating for each characteristic)**

Characteristics	Rating				
Applications experience	1	2	3	4	5
Applications offered	1	2	3	4	5
Integration experience	1	2	3	4	5
Staff experience	1	2	3	4	5
Hardware experience	1	2	3	4	5
Hardware offered	1	2	3	4	5
Vendor support experience	1	2	3	4	5
Systems software experience	1	2	3	4	5
Systems software offered	1	2	3	4	5
Agency experience	1	2	3	4	5

Characteristics			Rating		
Vendor location	1	2	3	4	5
Delivery schedule	1	2	3	4	5
Other (**specify**): _____	1	2	3	4	5

26. How important do you believe each of the following factors should be in controlling vendor selection for midsize systems by federal agencies? Use a 1-5 scale to rate each factor, 5 = crucial importance, and 1 = of no importance at all. (**read each factor, circle one response**)

			Rating		
Technical Solution	1	2	3	4	5
Contract Type	1	2	3	4	5
Risk Containment Procedures	1	2	3	4	5
Initial Cost	1	2	3	4	5
Life Cycle Cost	1	2	3	4	5
Other (**specify**): _____	1	2	3	4	5

G

Additional Vendors
Supplying Midsize Systems
to the Federal Market

G

Appendix: Additional Vendors Supplying Midsize Systems to the Federal Market

This appendix lists vendors that were included in the "other" categories of Exhibits III-6 and III-7.

For Exhibit III-6:

Vendor Share of Installed Mid Size Systems; Percentage by Number of Systems

- Adage
- Alliant
- Alpha-Micro
- Apollo
- Applicon
- AT&T
- Auto-Trol
- Calma
- Chromatics
- Com-Consol
- Com-Vision
- Comp-Auto
- Concurrent
- Convergent
- Daisy
- E&S
- Gould
- Harris
- Inforex
- Intertec
- Masscomp
- McAuto
- MDCS
- Mentor

- Modcomp
- Motorola
- NCR
- Nixdorf
- Novell
- Pertec
- Plessey-Per
- Plexus
- Point-4
- Prime
- Pyramid
- Ramtek
- Raster-Tech
- Ridge
- Silicon-GR
- Tandem
- Tektronix
- Telex
- Texas Instruments
- Ultimate
- Valid-Logic
- WICAT
- Zilog

For Exhibit III-7:

Vendor Share of Installed Mid Size Systems; Percentage by Purchase
Value of Systems

- Adage
- Alliant
- Alpha-Micro
- Apollo
- Applicon
- AT&T
- Auto-Trol
- Calma
- Chromatics
- Com-Consol
- Com-Vision
- Comp-Auto
- Concurrent
- Convergent
- Daisy
- Datapoint
- E&S
- Gould
- Inforex
- Intergraph
- Intertec
- Masscomp
- McAuto
- MDCS

- Mentor
- Modcomp
- Motorola
- NCR
- Nixdorf
- Novell
- Pertec
- Plessey-Per
- Plexus
- Point-4
- Pyramid
- Ramtek
- Raster-Tech
- Ridge
- Silicon-GR
- Tandem
- Tektronix
- Telex
- Texas Instruments
- Ultimate
- Valid-Logic
- WICAT
- Zilog

VIII

About INPUT

Company Profile	INPUT provides planning information, analysis, and recommendations to managers and executives in the information processing industries. Through market research, technology forecasting, and competitive analysis, INPUT supports client management in making informed decisions.
	Continuous-information advisory services, proprietary research/consulting, merger/acquisition assistance, and multiclient studies are provided to users and vendors of information systems and sevices (software, processing services, turnkey systems, systems integration, professional services, communications, and systems/software maintenance and support).
	Many of INPUT's professional staff members have more than 20 years' experience in their areas of specialization. Most have held senior management positions in operations, marketing, or planning. This expertise enables INPUT to supply practical solutions to complex business problems.
Staff Credentials	Formed as a privately held corporation in 1974, INPUT has become a leading international research and consulting firm. Clients include more than 100 of the world's largest and most technically advanced companies.
	INPUT's professional staff have backgrounds in marketing, planning, information processing, and market research in some of the world's leading organizations. Many of INPUT's professional staff have held executive positions in the following business sectors:

- Computer systems
- Software
- Turnkey systems
- Field service
  (customer service)

- Processing services
- Professional services
- Data processing
- Network services
- Communications

Educational backgrounds include both technical and business specializations, and many INPUT staff hold advanced degrees.

Domestic and European Advisory Services	

Domestic and European Advisory Services

INPUT offers ten basic information services: eight covering U.S. information industry markets and two covering European information industry markets.

1. Market Analysis Program—U.S. (MAP)

Provides up-to-date U.S. information services market analyses, five-year forecasts, trend analyses, and sound recommendations for action. MAPS is designed to satisfy the planning and marketing requirements of current and potential information services vendors.

2. Market Analysis Program—Europe (MAPE)

Analyzes and forecasts European software and services markets. Clients receive timely planning information through research-based studies, conferences, client meetings, and continuous client support.

3. Vendor Analysis Program (VAP)

Is a comprehensive reference service covering more than 4,000 U.S. information services vendor organizations. VAP is often used for competitive analysis and prescreening of acquisition and joint venture candidates.

4. Electronic Data Interchange Program (EDIP)

Focusing on what is fast becoming a major computer/communications market opportunity, INPUT's EDIP keeps you informed. Through monthly newsletters, timely news flashes, comprehensive studies, a joint user/vendor conference, and telephone inquiry privileges, you will be informed and stay informed about the events and issues impacting this burgeoning market.

5. Systems Integration Program (SIP)

Focus is on the fast-moving world of systems integration, and the provision of complex information systems requiring multiple products and services. Covers this infant segment in-depth by tracking both the federal and commercial markets via monthly project profiles, market analysis reports, a monthly newsletter, seminars, conferences, a presentation, and hotline inquiry service privileges.

6. Federal Information Systems and Services Program (FISSP)

Presents highly specific information on U.S. federal government procurement practices, identifies information services vendor opportunities, and provides guidance from INPUT's experienced Washington professionals to help clients maximize sales effectiveness in the federal government marketplace.

7. Information Systems Program (ISP)

Is designed for executives of small, medium, and large information systems organizations and provides crucial information for planning, procurement, and management decision making. The program examines new service offerings, technological advances, user requirements for systems and services, IS spending patterns, and more. ISP is widely used by both user and vendor organizations.

8. Integrated Communications Program (ICP)

Provides management insight to ensure effective use of telecommunications. This program provides a comprehensive set of services, including major vendor profiles, market/service trends assessment, service quality assessment, national service profiles for 40 countries, quarterly service news reports, a handbook of international public data networks, issue study reports, conferences, and hotline client inquiry services.

9. Customer Service Program—U.S. (CSP)

Provides customer service organization management with data and analyses needed for marketing, technical, financial, and organizational planning. The program pinpoints user perceptions of service received, presents vendor-by-vendor service comparisons, and analyzes and forecasts service markets for large systems, small systems, telecommunications systems, software maintenance, and third-party maintenance.

10. Customer Service Program—Europe (CSPE)

Parallels the U.S. Customer Service Program, dealing with comparable issues in European markets.

Merger & Acquisition Services

INPUT also offers merger and acquisition services that are tailor-made for your requirements. Our years of experience and data base of company information about information systems and services companies have helped many companies.

Customized Advisory Services Available	In addition to standard continuous-information programs, INPUT will work with you to develop and provide a customized advisory service that meets your unique requirements.

An Effective Combination	INPUT'S Executive Advisory Services are built on an effective combination of research-based studies, client meetings, informative conferences, and continuous client support. Each service is designed to deliver the information you need in the form most useful to you, the client. Executive Advisory Services are composed of *varied combinations of the following* products and services:

Research-Based Studies
Following a proven research methodology, INPUT conducts major research studies throughout each program year. Each year INPUT selects issues of concern to management. Topical reports are prepared and delivered throughout the calendar year. 1988 projects include:

- √ SAA - Impact on the Industry
- √ CASE - A Comprehensive Analysis
- √ SI Impact on Professional Services Market
- √ Emerging Network-Based Information Service Markets
- √ VAR - Alternate Distribution Channels
- √ SI Buyer Issues and Trends Report
- √ SI Competitive Analysis Report
- √ SI Forecast and Trends Report
- √ Data Base Management: Current Trends and Challenges
- √ Workstation Strategies Report Series
- √ ISDN andVoice/Data Integration
- √ CASE and Application Development Productivity
- √ EDI and Professional Services
- √ X.400 Products and Services

. . . and more!

Information Service Industry Reports
INPUT's Executive Advisory Services address specific issues, competitive environment, and user expenditures relative to:

Software	Professional Services
Processing/Network Services	Turnkey Systems
Systems Integration	Small-Systems Service
Telecommunications Service	Third-Party Maintenance
Office Systems	Large-Systems Service

Industry Market Reports
Detailed analyses of market trends, forces driving the markets, problems, opportunities, and user expenditures are available for the following segments:

Banking/Finance
Discrete Manufacturing
Distribution
Education
Federal/State and Local Government
Insurance
Medical
Process Manufacturing
Service Industry

Telecommunications
Utilities
Accounting
Education/Training
Engineering/Scientific
Human Resources
Other Cross-Industry Markets
Transportation

Hotline: Client Inquiry Services
Daily, weekly, monthly, quarterly, and annual client planning questions
are answered quickly and completely through use of INPUT's Client
Hotline. Clients may call any INPUT office (California, New Jersey,
Washington D.C., or London) during business hours or they may call a
unique voicemail service to place questions after-hours. This effective
Hotline service is the cornerstone of every INPUT Executive Advisory
Service.

The Information Center
One of the largest and most complete collections of information services
industry data, the Information Center houses literally thousands of up-to-
date files on vendors, industry markets, applications, current/emerging
technologies, and more. Clients have complete access to the Information
Center. In addition to the information contained in its files, the center
maintains an 18-month inventory of over 130 major trade publications,
vendor consultant manuals, economic data, government publications, and
a variety of important industry documents.

Access to INPUT Professional Staff
Direct access to our staff, many of whom have more than 20 years of
experience in the information industry, provides you continuous research
and planning support. When you buy INPUT, you buy experience and
knowledge.

Annual Client Conference
Each year, you can attend INPUT's Annual Client Conference. This
three-day event addresses the status and future of the information services
industry, the competitive environment, important industry trends poten-
tially affecting your business, the impact of new technology and new
service offerings, and more.

You will attend with top executives from many of the industry's leading,
fastest-growing, and most successful vendor companies, and with top In-

formation Systems (IS) managers from some of the world's most sophis-
ticated user organizations.

On-Site Presentation by INPUT Executive
Many of INPUT's Planning Services offer an informative presentation at
your site. Covering the year's research, this session is held in the fourth
quarter of each calendar year.

Proprietary Research Service	INPUT conducts proprietary research that meets the unique requirements of an individual client. INPUT's custom research is effectively used:

For Business Planning
Planning for new products, planning for business startups, planning ex-
pansion of an existing business or product line—each plan requires
reliable information and analysis to support major decisions. INPUT's
dedicated efforts and custom research expertise in business planning
ensure comprehensive identification and analysis of the many factors
affecting the final decision.

For Acquisition Planning
Successful acquisition and divestiture of information services companies
requires reliable information. Through constant contact with information
services vendor organizations, continuous tracking of company size,
growth, financials, and management "chemistry," INPUT can provide the
valuable insight and analysis you need to select the most suitable candi-
dates.

For the Total Acquisition Process
INPUT has the credentials, the data base of company information, and
most importantly, the contacts to assist you with the total acquisition and/
or partnering relationship processes:

√   Due Diligence
√   Schedules and Introduction
√   Criteria & Definitions
√   Retainer and Fee-Based
√   Active Search

For Competitive Analysis
Knowing marketing and sales tactics, product capabilities, strategic ob-
jectives, competitive posture, and strengths and weaknesses of your com-
petition is as critical as knowing your own. The career experience of
INPUT's professionals, coupled with its collection and maintenance of
current financial, strategic, tactical, and operational information about
more than 4,000 active companies, uniquely qualifies INPUT to provide
the best competitive information available today.

For Market and Product Analysis
Developing new products and entering new markets involves consider-
able investment and risk. INPUT regularly conducts research for clients
to identify product requirements, market dynamics, and market growth.

More About INPUT...
- More than 5,000 organizations, worldwide, have charted business
  directions based on INPUT's research and analysis.

- Many clients invest more than $50,000 each year to receive INPUT's
  recommendations and planning information.

- INPUT regularly conducts proprietary research for some of the largest
  companies in the world.

- INPUT has developed and maintains one of the most complete informa-
  tion industry libraries in the world (access is granted to all INPUT
  clients).

- INPUT clients control an estimated 70% of the total information indus-
  try market.

- INPUT analyses and forecasts are founded upon years of practical ex-
  perience, knowledge of historical industry performance, continual
  tracking of day-to-day industry events, knowledge of user and vendor
  plans, and business savvy.

- INPUT analysts accurately predicted the growth of the information
  services market—at a time when most research organizations deemed it
  a transient market. INPUT predicted the growth of the microcomputer
  market in 1980 and accurately forecasted its slowdown in 1984.

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